

CITY OF GUSTAVUS LIBRARY

ROOF INSPECTION

November 2, 2018



Prepared for:

**Tom Williams, City Administrator
PO Box 1
Gustavus, Alaska 99826**



Prepared by:

**PDC Engineers
6205 Glacier Highway
Juneau, Alaska 99801
PDC Project No. 18324JN**

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INTRODUCTION

On October 8, 2018, the Gustavus City Council approved our fee proposal to make a site visit and prepare a report. Tom Williams, City Administrator of Gustavus, provided a purchase order on October 9, 2018 for recommendations for the Gustavus Library roof. We signed and returned the Purchase Order on October 9, 2018 and scheduled a site visit for that Friday, October 12, 2018.

HISTORY

Cheryl Cook, City Council Member, provided a copy of the original drawings, pictures, and commentary of the specific issues. Cheryl first contacted us in July when replacing some metal roofing, they discovered rot in the roof panel sheathing and the beams/blocking at the ridge. They did not remove all of the roofing material to investigate all the rot, so it is unknown how far it extends.

The original design documentation for the Gustavus Library in Gustavus, Alaska was sealed by Minch Ritter Voelckers Architects in January 1997, now doing business as MRV Architects. It is a one story building with an attic space above. A copy of the original plans are included in Appendix C.

The Uniform Building Code (UBC) 1994 Edition was used for the original documents. The current adopted code is the International Building Code (IBC) 2012. The original plans did not specify the snow load used. City & Borough of Juneau (CBJ) specifies 50 psf, and from a research paper, Snow Loads in Alaska, done by the Arctic Environmental Information and Data Center at University of Alaska-Fairbanks in 1987, they specify a ground snow load of 66 psf, which is equal to a roof snow load of 46.2 psf.

The Library was built using Structural Insulated Panels (SIPs). SIPs are pre-manufactured panels that consist of two sheets of oriented strand board (OSB), which is structural sheathing, and is glued to the top and bottom of rigid foam. They can have structural lumber incorporated into the panel joints, but commonly do not. The SIPs on this project are called out as 10 inches, which includes the structural sheathing on the top and bottom. In looking at a SIP panel manufacturer's load table, their 10 inch panels can span 18' and support 40-50 psf snow load. We do not know what capacity these SIPs are designed for. We have a call into Robert Minch, who is semi-retired, to see if MRV has files related to the SIPs that might indicate the snow load capacity. The drawings call for 2x12's @16" on center supporting the SIP panels at the ridge, plan detail B on A10. The 2x12's span 17'-4", are braced in the middle, and support 40 psf snow load. The 5-1/8"x9-1/2" glue laminated beam (GLB) spans are 26'-0" long with a mid-support at 11'-6". The GLBs support 50 psf snow load.

SIP roof panels have a poor performance history in Southeast Alaska. Problems have been attributed to moisture getting into the panels and rotting the sheathing. Typically the source of the moisture is interior condensation getting into the panels and turning to water.

The Library is located on the northwest side of Gustavus Road. For the purposes of this report, the front of the library, facing the road, is the east side of the building.

INSPECTION METHODS

The condition survey was conducted by PDC Engineer, Janice Simmons, EIT, on Friday, October 12, 2018. A few photographs and notes were taken during the investigation. Most of the photographs were provided by Cheryl and were taken during their initial discovery of the rot when the roofing material was pulled up.

Equipment used during the inspection included a ladder, tape measure, and screw driver to test for rot. No demolition occurred within the scope of this survey.

OBSERVATIONS AND CONDITIONS

Once on site, Cheryl provided plans and showed photos of the rot they found on the roof. An investigation was done in the attic where there was no sign of rot. A stamp was found on the wall that may be related to the SIP manufacturer, **Figure 1**. We tried to call the number for the SIP manufacturer but the line has been disconnected. Another stamp was found for the structural sheathing manufacturer, **Figure 2**. A walk through of the building was also done, where nothing problematic was noticed.

The roof inspection was then conducted. There were lots of screw heads sticking up above the roof. Cheryl said there used to be snow stops on the roof that were ripped off from the snow, leaving the screws, **Figure 3**. Under one of the panels, the screws had created a point of entry for water and contributed to the rotted firring strip, **Figure 4**. The metal ridge vent was removed to expose the tar paper, which was cut to expose the foam. The edges of the SIP top layer of sheathing had rot, **Figures 5-7**. There was also significant rot was about a foot down from the ridge, **Figure 11**. It looks like the rot likely continues beyond the exposed area but the extent is unknown at this time.

From the provided photos, the worst section of exposed rot observed appears to be approximately 3 feet by 1 foot. It is located below the stack sticking out of the roof, **Figures 8-10**. This location appeared to be at one of the horizontal firring strips. Typically when firring strips are used on the roof, they are installed vertically. This allows any moisture build up to drain down the roof. It also allows the air to ventilate from the eave up to the ridge and out through the ridge cap. Since the firring strips were installed horizontally, they likely held the moisture up on the roof. This indicates there may be rot at each of the firring strips, possible across the entire length of the building, which decreases the overall performance of the SIP. A repair option is discussed below.

REPAIR OPTION

If there is rot under all of the firring strips, then the top layer of sheathing of the SIP is not performing as it should. To repair, the top plywood and foam would be cut out to allow a member to be placed in the panel, which would provide the span capacity of the assembly. The member would protrude out of the panel and take the place of firring strips and provide the roof with a ventilation gap. There would be a sealant around the SIP to ensure moisture does not get into the panels. By assuming a snow load of 50 psf, three member sizes were calculated to work; 2x12@12"oc, 3x12@16"oc, and 4x12@24"oc. For this option, the new member would act to carry the loads over the span and the SIP would only be used to provide the insulation. Screws should be used to connect the bottom of the SIP with the new rafter. All rafter splices should be strapped and

rafters should be connected to bearing walls with A34 clips. Details of our suggested repair are included in Appendix B.

If our assumption that the rot is occurring at all of the furring strips is incorrect, and there are only localized areas of rot, we may be able to recommend a different repair option or limit the repair to the rotted area. Full exposure of the roof is needed to investigate the extent of the rot.

SUMMARY

The extent of the rot is unknown. However, due to the construction of the furring strips being horizontal and screws penetrating to the SIP's, it is likely the rot was caused from water being obstructed and seeping through the holes to the OSB. Deterioration on the plywood of the SIP, causes the panel to have less capacity to span distances. Therefore, rafters shall be cut into the SIP to carry the loads across the spans and the SIP's shall provide the insulation.

If specific situations arise during this process and you would like specific details, please do not hesitate to contact us.

APPENDIX A

Photos

SITE VISIT PHOTOS 10/12/2018

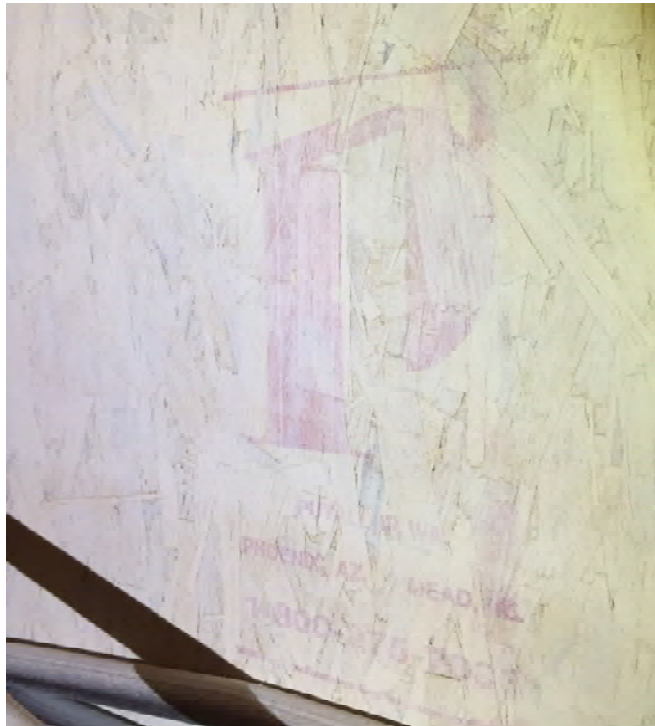


Figure 1- Possible SIP Manufacturer Stamp "Phoenix, AZ 1-800-275-7000"



Figure 2- Sheathing Stamp



Figure 3- Snow Stop Screws



Figure 4- Rotten Wood Under Metal Roofing



Figure 5- Roof Ridge



Figure 6- Roof Ridge Foam



Figure 7- Ridge Foam and Rotten Wood

PROVIDED PHOTOS



Figure 8- Roof Rot Investigation



Figure 9- Roof Rot Investigation



Figure 10- Roof Rot Location



Figure 11- Roof Rot at Ridge



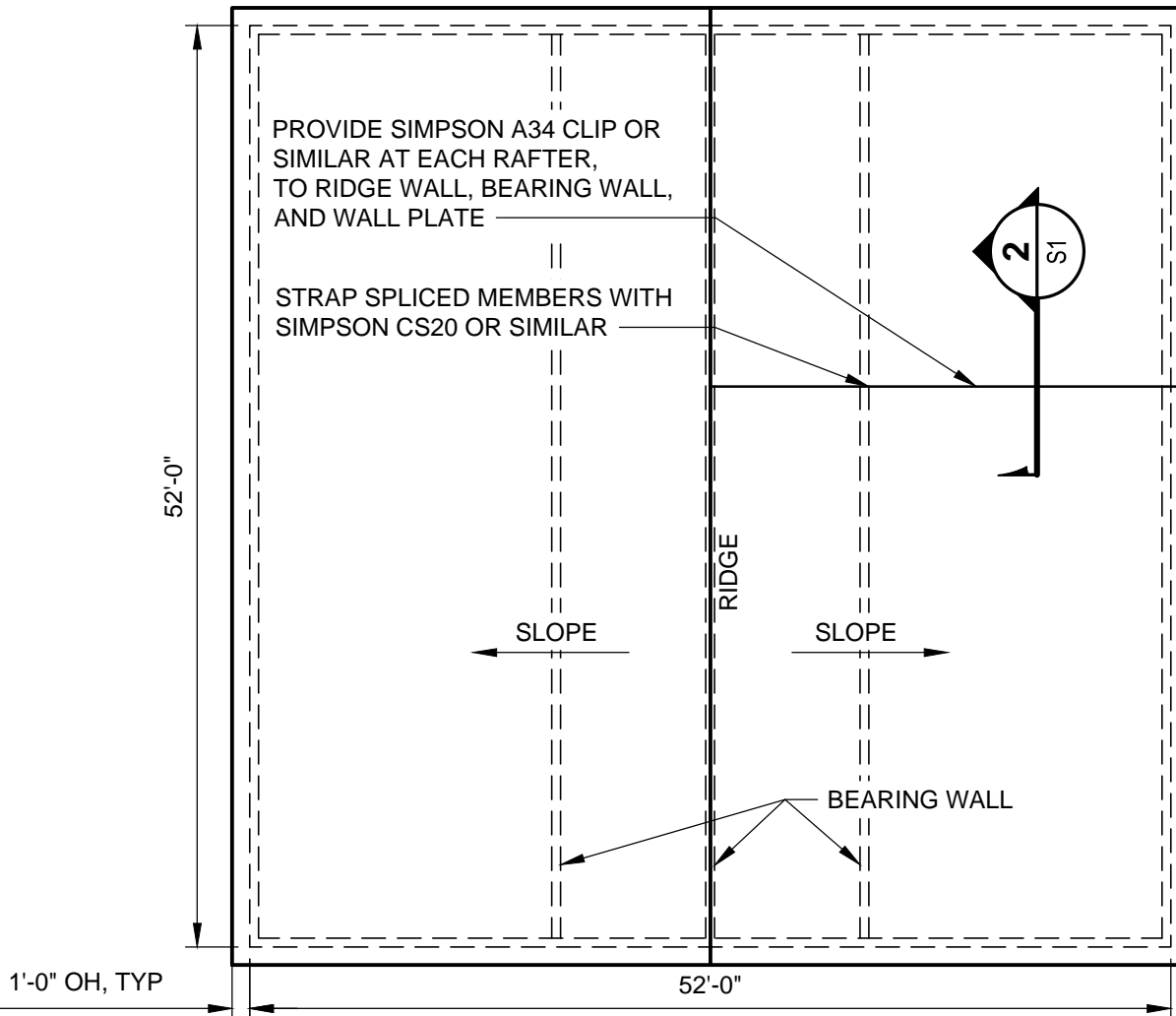
Figure 12- Attic Framing



Figure 13- Attic Framing

APPENDIX B

Repair Option

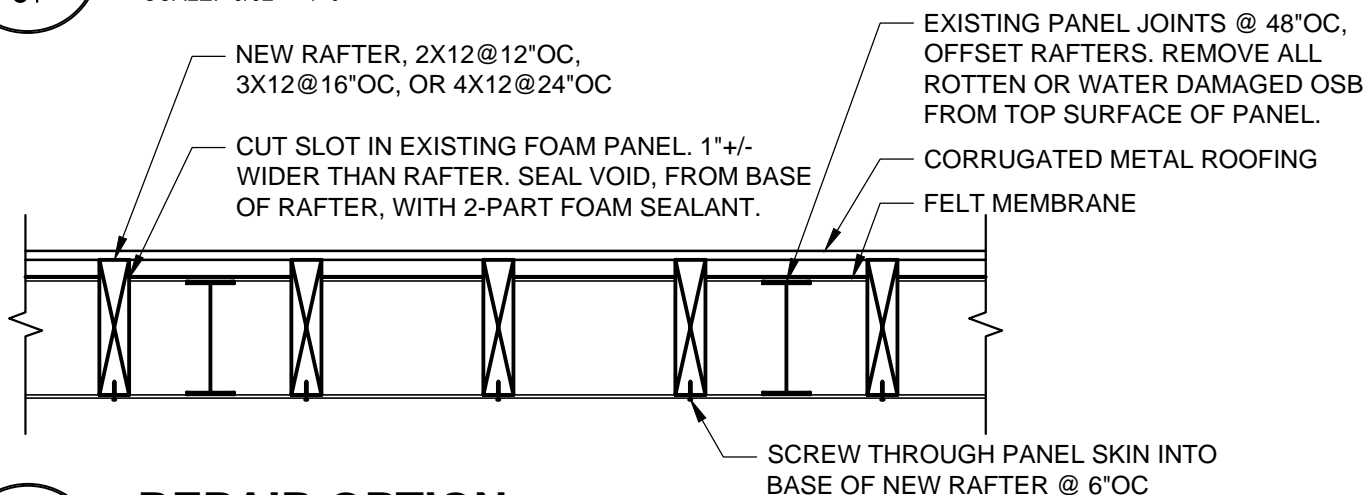


1

ROOF LAYOUT

S1

SCALE: 3/32" = 1'-0"



2

REPAIR OPTION

S1

SCALE: 3/4" = 1'-0"

P:\2018\18324JN-COG_Lib_FH\SMModel\Gustavus Library_18324JN: Layout1 Nov 02, 2018 2:44 PM

APPENDIX C

Original Design Documents

ARCHITECTS
 800 GLACIER AVENUE
 JUNEAU, ALASKA 99801
 907-586-1371 FAX: 907-483-5544

JOHN SCOTT
 ALASKA COASTAL ENGINEERS
 JUNEAU, ALASKA 99801
 907-586-1371 FAX: 907-483-5544

WIMONT & WILSON ENGINEERS
 JUNEAU, ALASKA 99801
 907-586-1371 FAX: 907-483-5544

CONCRETE
 1.01 CONCRETE
 1.02 CONCRETE
 1.03 CONCRETE
 1.04 CONCRETE
 1.05 CONCRETE
 1.06 CONCRETE
 1.07 CONCRETE
 1.08 CONCRETE
 1.09 CONCRETE
 1.10 CONCRETE
 1.11 CONCRETE
 1.12 CONCRETE

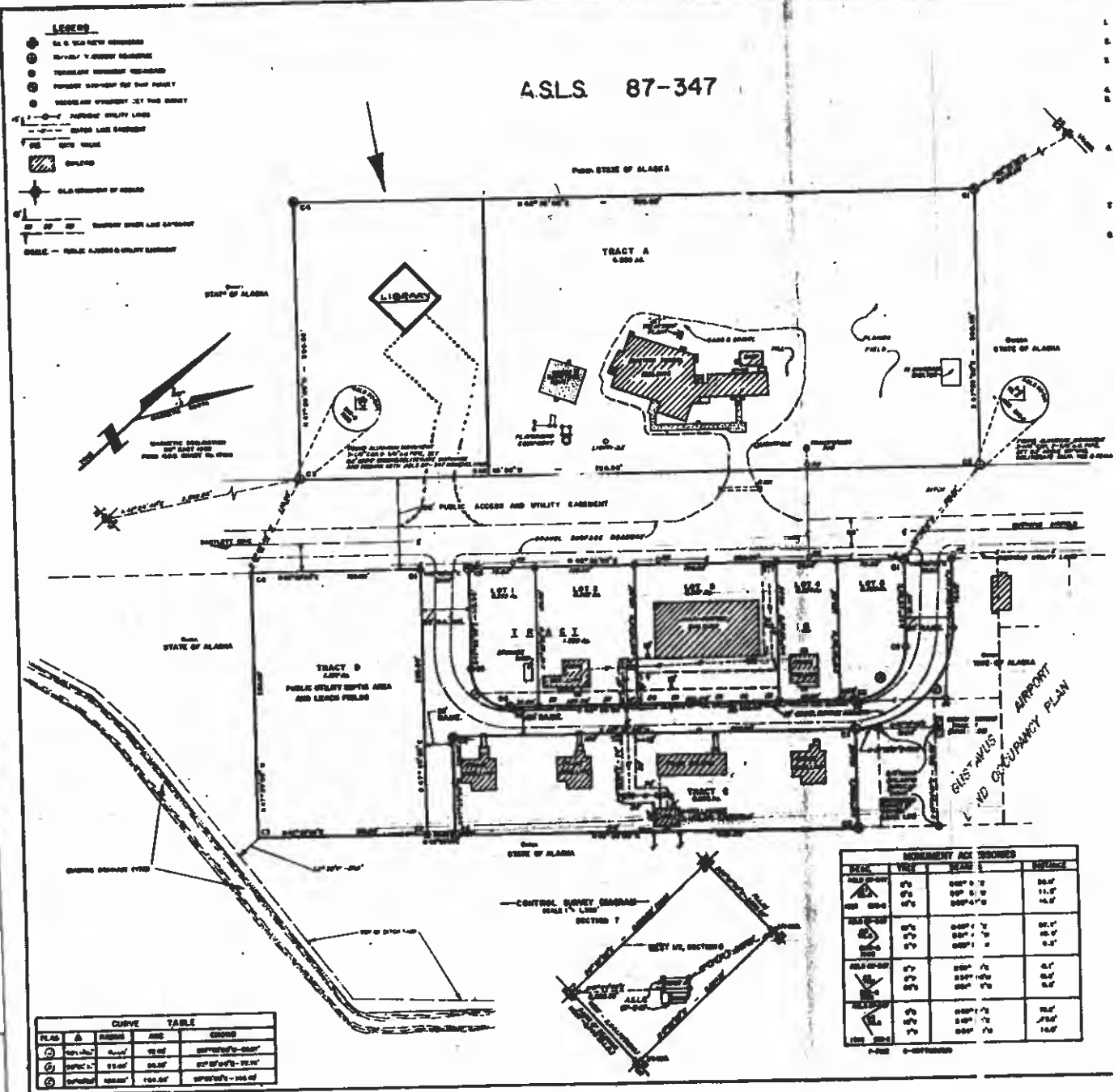
ELECTRICAL
 1.01 ELECTRICAL
 1.02 ELECTRICAL
 1.03 ELECTRICAL
 1.04 ELECTRICAL
 1.05 ELECTRICAL
 1.06 ELECTRICAL
 1.07 ELECTRICAL
 1.08 ELECTRICAL
 1.09 ELECTRICAL
 1.10 ELECTRICAL
 1.11 ELECTRICAL
 1.12 ELECTRICAL

GUSTAVUS LIBRARY
 1.01 GUSTAVUS LIBRARY
 1.02 GUSTAVUS LIBRARY
 1.03 GUSTAVUS LIBRARY
 1.04 GUSTAVUS LIBRARY
 1.05 GUSTAVUS LIBRARY
 1.06 GUSTAVUS LIBRARY
 1.07 GUSTAVUS LIBRARY
 1.08 GUSTAVUS LIBRARY
 1.09 GUSTAVUS LIBRARY
 1.10 GUSTAVUS LIBRARY
 1.11 GUSTAVUS LIBRARY
 1.12 GUSTAVUS LIBRARY



GUSTAVUS LIBRARY
 JANUARY, 1997

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GUSTAVUS LIBRARY
 JANUARY, 1997

A1

SITE

THE LAND IS FLAT MARSHY WITH SCATTERED PINE, SPRUCE AND COTTONWOOD (3 TO 12") WITH LITTLE CLAYSTONE BEDDING.

SOIL
2" TO 4" ORGANIC OVERBURDEN THEN SANDY CLAY TO 4' AND 10' THEN COARSE RED SAND TO 20' OR MORE. SEE SEPTIC PLAN FOR PERC. TESTS. NO SOIL REMOVAL FROM SITE REQUIRED.

WATER
WATER IS OBTAINABLE AT 13' TO 15' VIA HAND DRIVEN SAND POINT

FILL BUILDING
PIT RUN FILL IS AVAILABLE AT LOCAL GRAVEL PIT. PLACE IN 8" MAXIMUM LIFTS, COMPACTED TO 95% OF OPTIMUM DENSITY.

PACKING AREA & DRIVE FILL
PIT RUN GRAVEL OVER GEOTECHNICAL FABRIC, PLACE IN 8" MAXIMUM LIFTS, MECHANICALLY COMPACTED TO 95% OF OPTIMUM DENSITY.

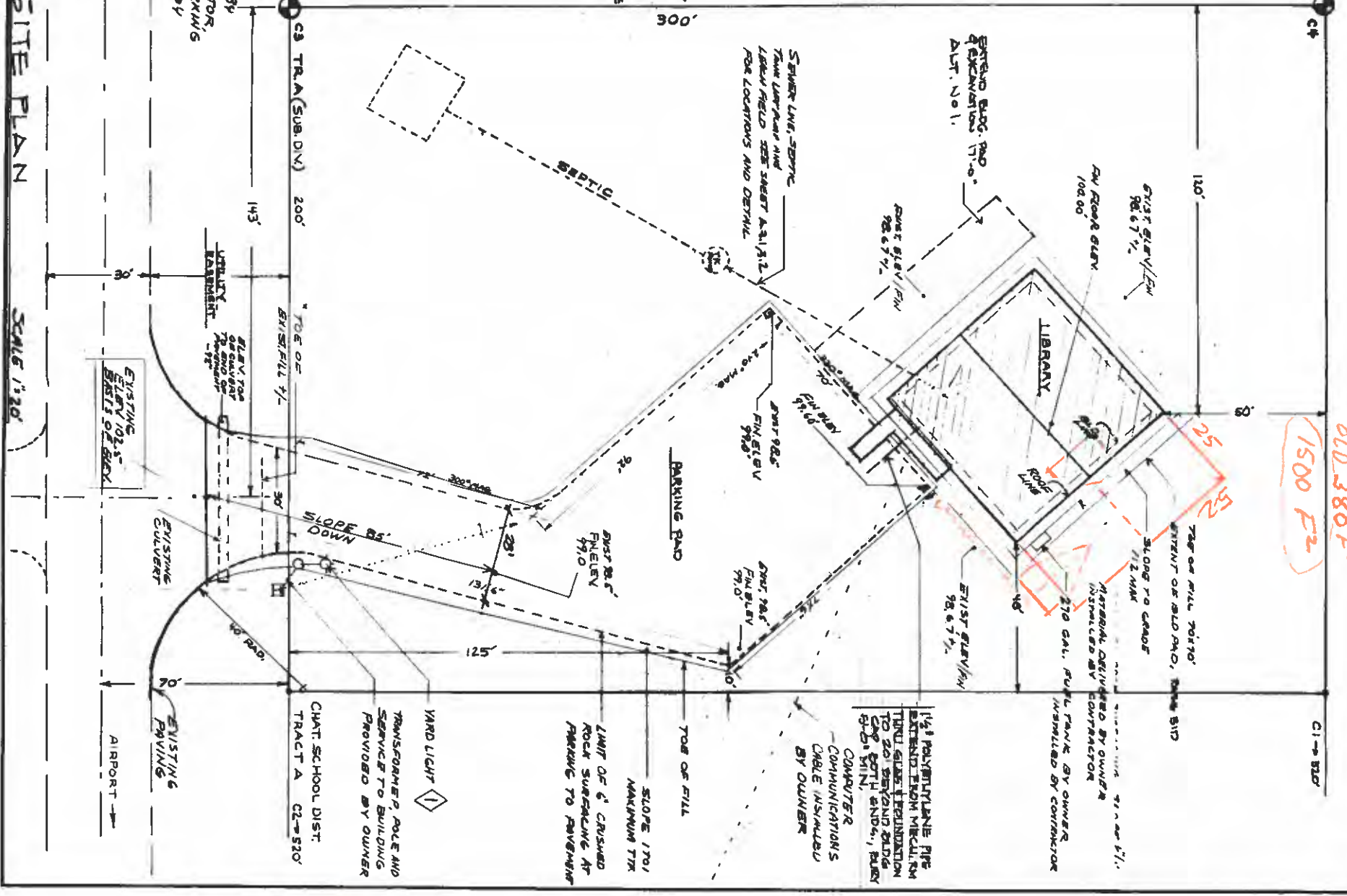
EXCAVATION
REMOVE ALL SOIL CONTAINING ORGANIC MATTER AND SANDY CLAY TO COMPACTED LAYER. REBUILD WITH FILLING LIME, TERRACING, PAD & DRIVE, REMOVE ALL SOILS CONTAINING ORGANIC MATTER. SOIL DISPOSAL: SPREAD WASTE SOILS UNIFORMLY OVER THE SITE.

CRUSHED ROCK SURFACING
LOCALLY AVAILABLE. 3" MINUS, PLACE IN ONE LAYER, ROAD SURFACING. SMOOTH INSTALL WATER BUILDING STRUCTURES COVERED. SURFACING AT BLD PROVIDED BY OWNER, IN STALLED BY CONTRACTOR. PARKING AT DRIVE AND PARKING PROVIDED AND INSTALLED BY CONTRACTOR

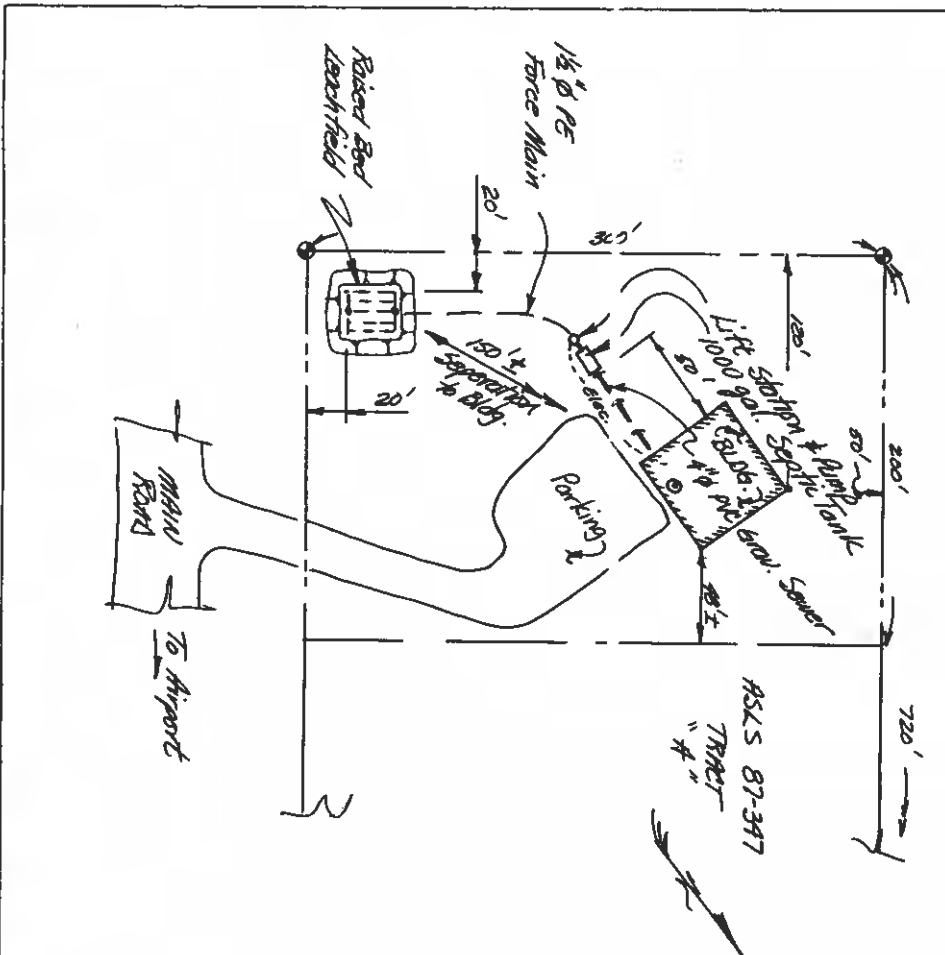
YARD LIGHT LAMP & FIXTURE
- COBALT AND STAINLESS 150W METAL HALIDE WITH PHOTO ELEC SWITCH, CONDUIT TO TRANSFORMER, INSTALL PER NEC. BY ELECTRICAL SUBCONTRACTOR.

SITE PLAN

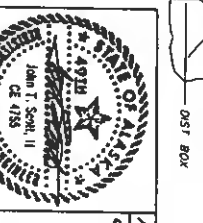
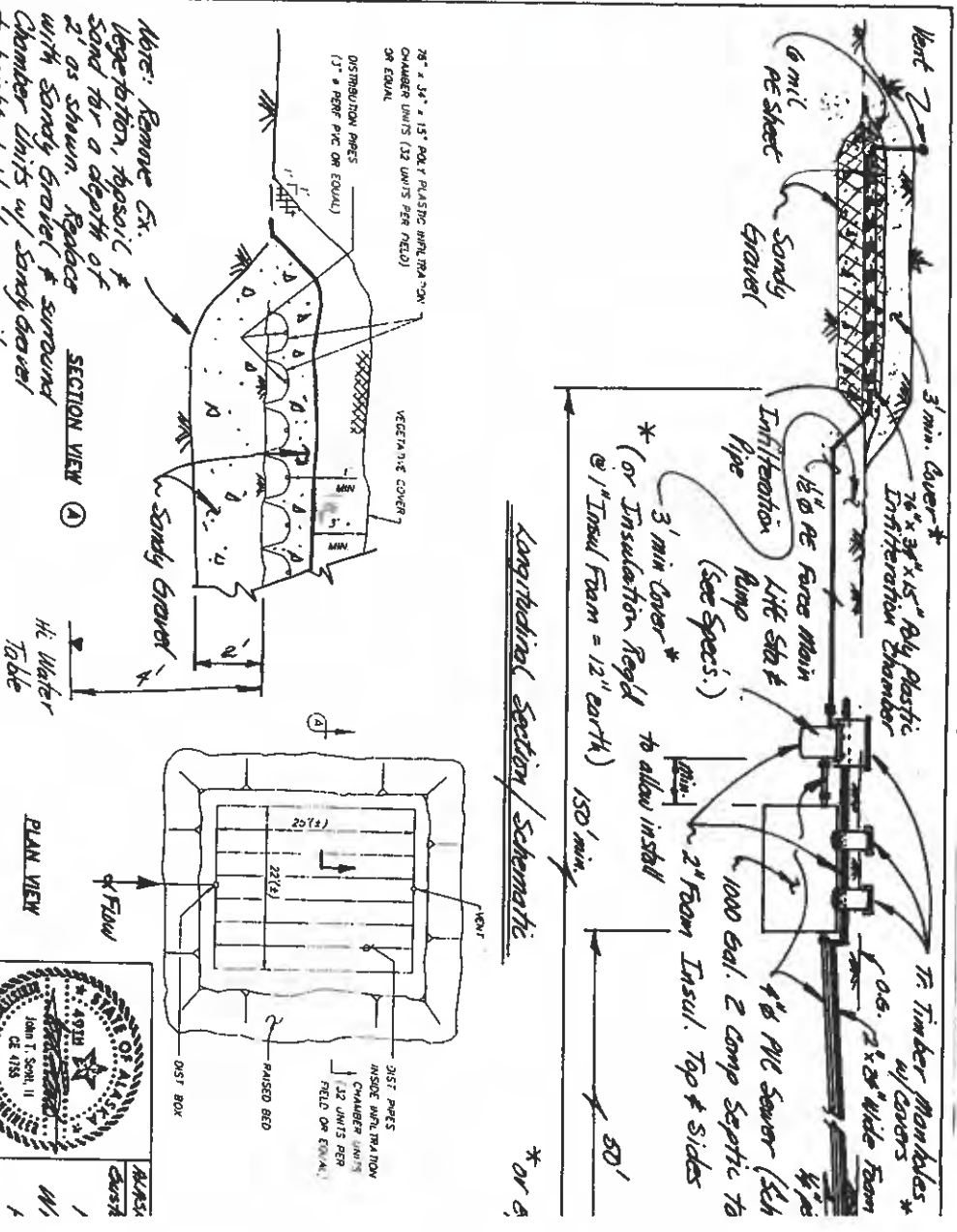
SCALE 1"=30'



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JANUARY, 1997
A2



ALASKA
DEPT. OF NATURAL RESOURCES
JANUARY, 1997



ALASKA
DEPT. OF NATURAL RESOURCES
JANUARY, 1997

CONCRETE SPECIFICATIONS

DESIGN & STRENGTH

PROVIDE CONCRETE MIX DESIGN PREPARED BY ALASKA LICENSED ENGINEERING LABORATORY UTILIZING THE AGGREGATE TO BE INCORPORATED INTO THE MIX, 8000 PSI. AT 28 DAYS (F'c)

SUBMITTALS

MIX DESIGN & COMPRESSION TESTS
CONCRETE WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301 "SPECIFICATIONS FOR BUILDINGS" EXCEPT AS NOTED.

FURTHER CEMENT TO CONFORM TO ASTM C-150 - TYPE I

REMOVE ALL CONCRETE FROM ANY POUR THAT DOES NOT TEST TO REQUIRED STRENGTH

MAXIMUM SLUMP 4 INCHES

MIN. OF THREE TEST CYLINDERS PER CONTINUOUS POUR - RECORD LOCATION OF ASSOCIATED POUR., TO BE TESTED BY ENG. TEST LAB.

MINIMUM CEMENT CONTENT SIX SACKS PER YARD

READY-MIX SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH ASTM C 94

SLABS TO BE AIR ENTRAINED WITH MAXIMUM WATER CONTENT .45/CEMENT AT EXTERIOR.

AGGREGATES SHALL CONFORM TO ASTM C 33.

ADMITTURES IN COMPLIANCE WITH ASTM A 494 MAY BE USED. NO CHLORIDES OR REDUCED WATER-CEMENT RATIO.

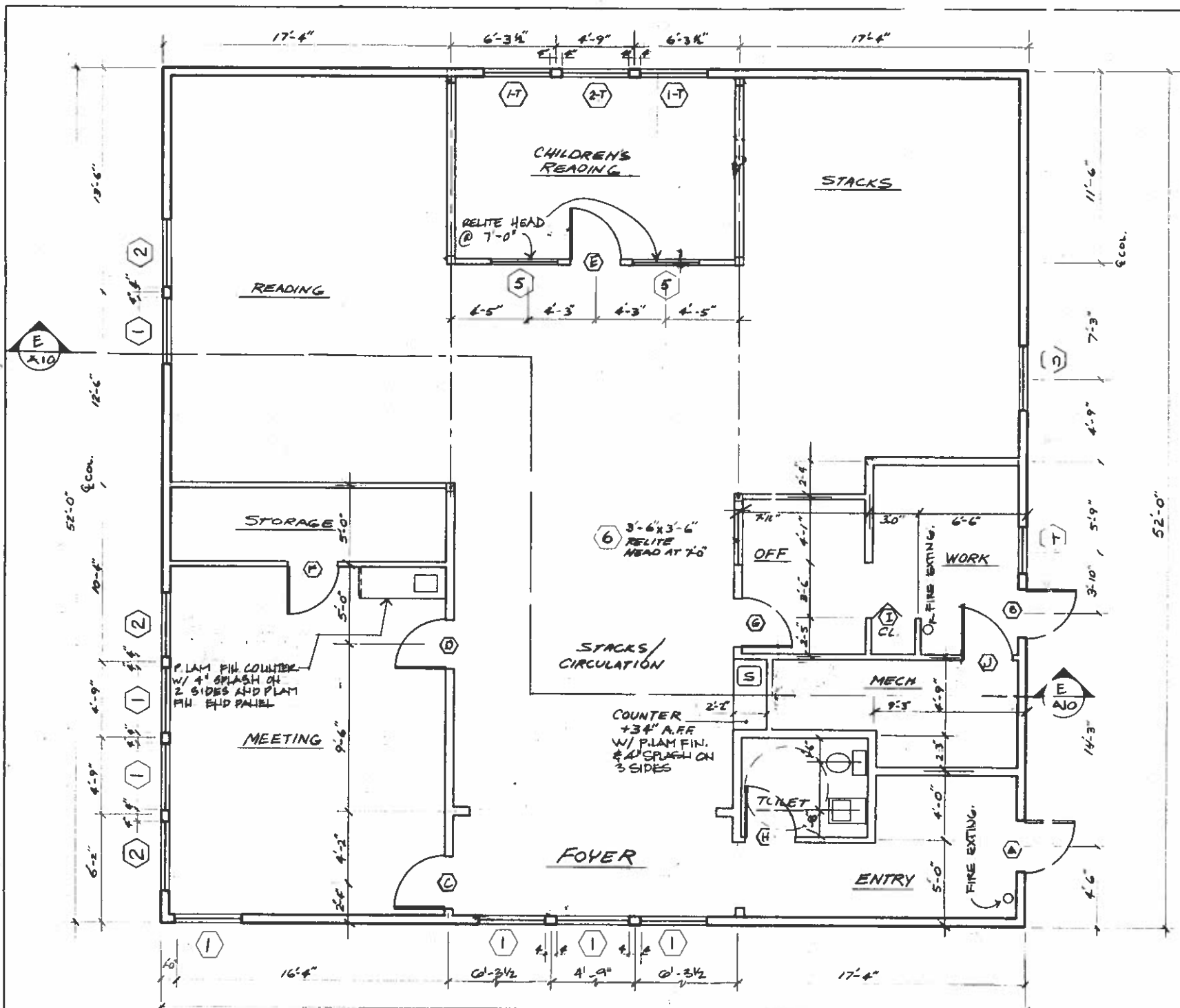
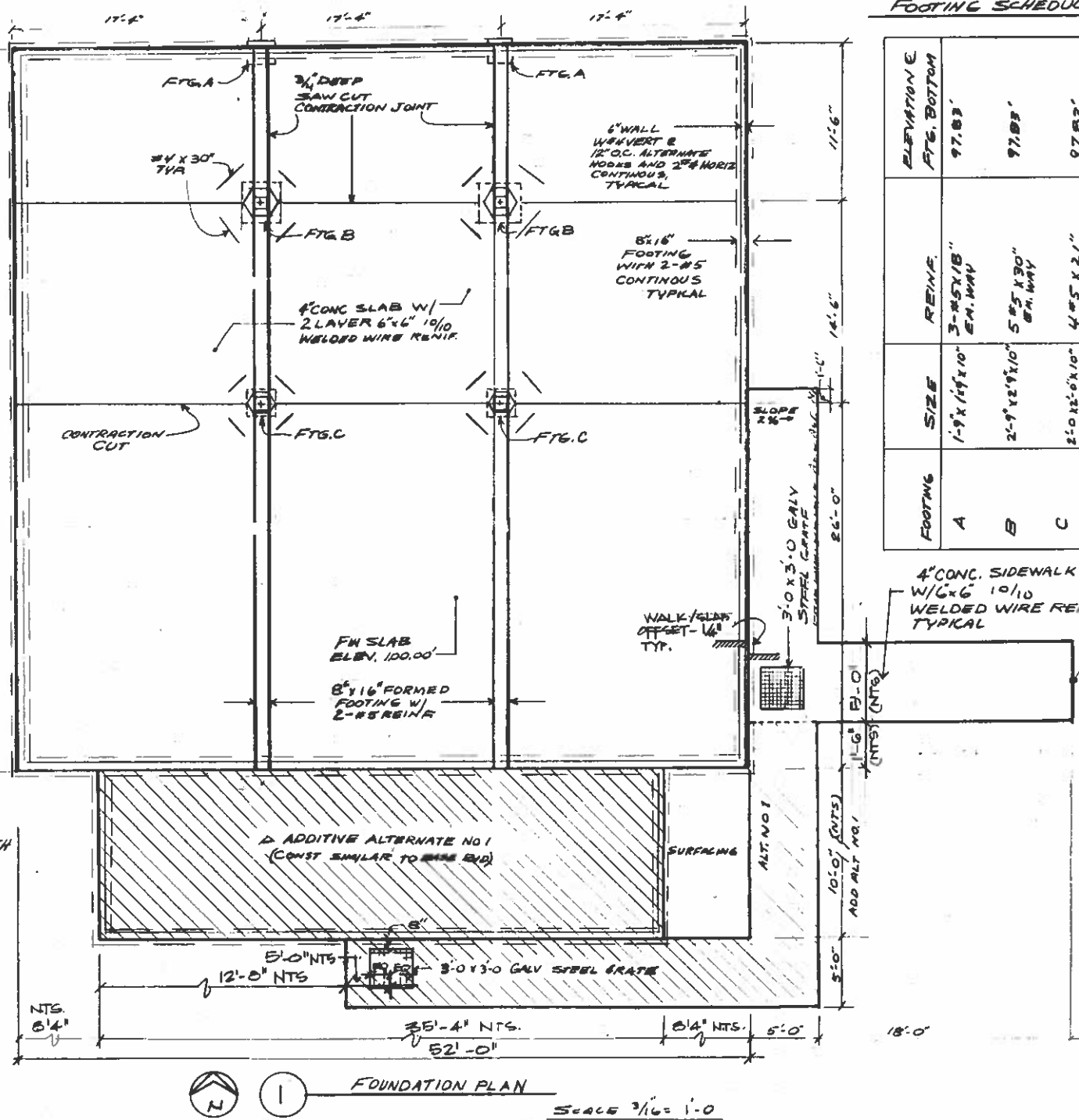
SLEEVE ALL PIPE PENETRATION OF STEM WALL W/ ABS PIPE.

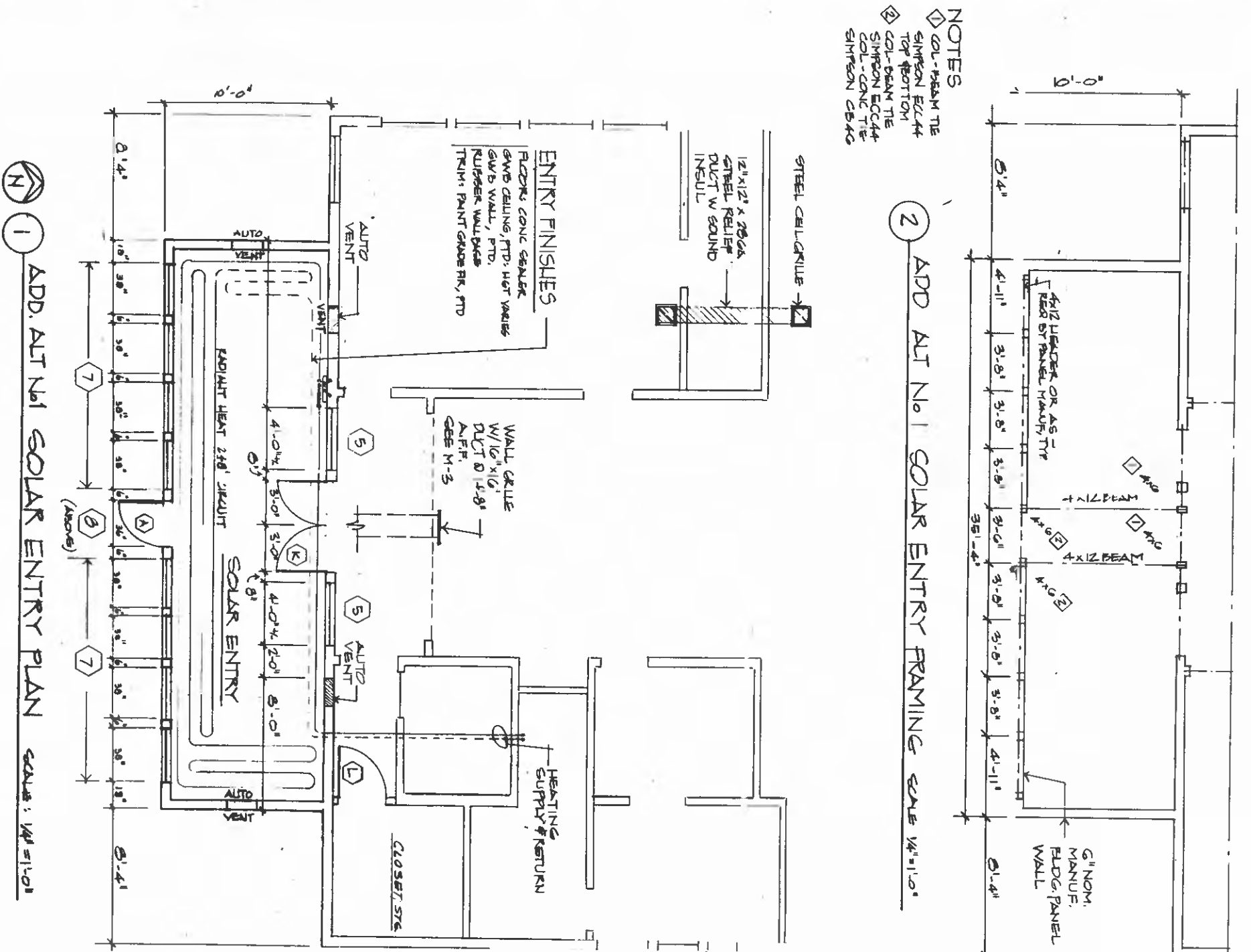
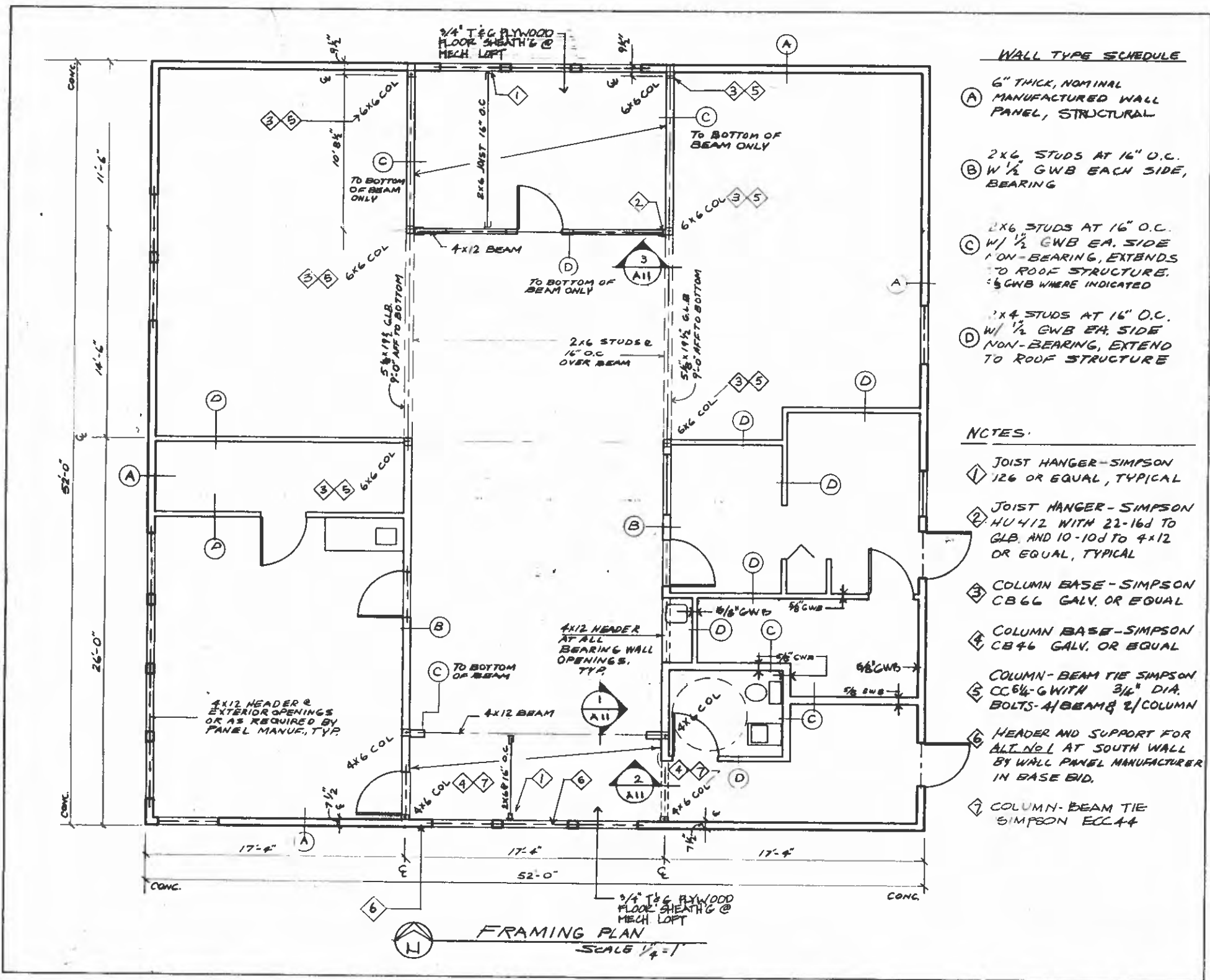
EXPOSED WALLWAYS FINISHED W/ LIGHT BROOMING

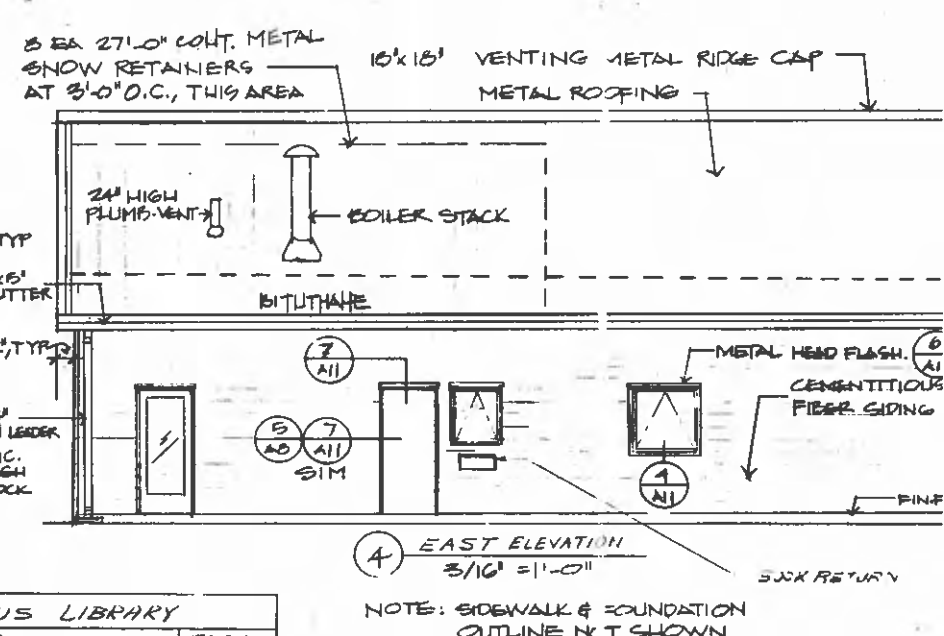
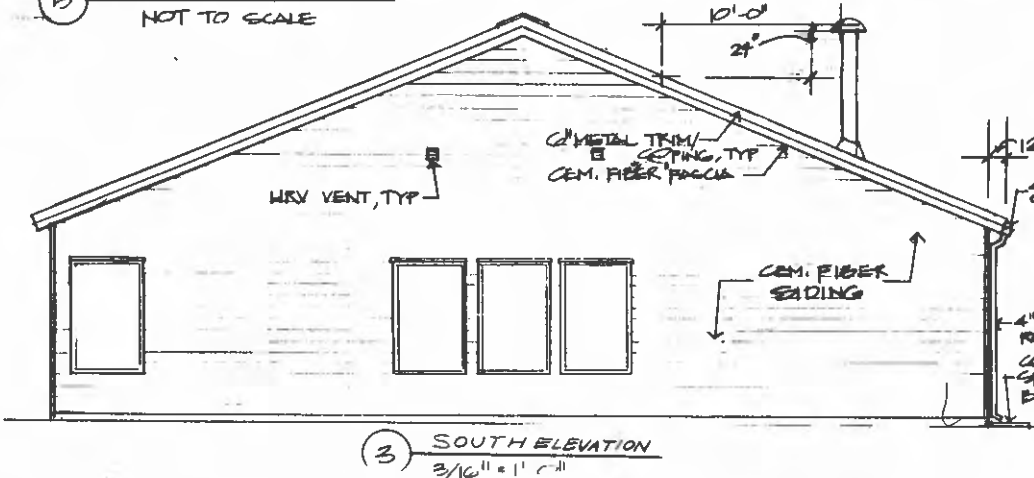
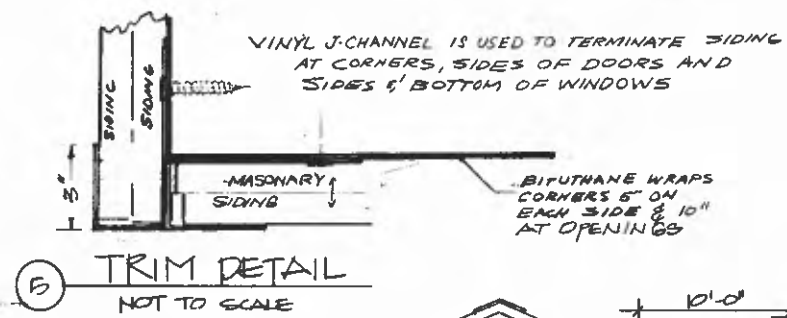
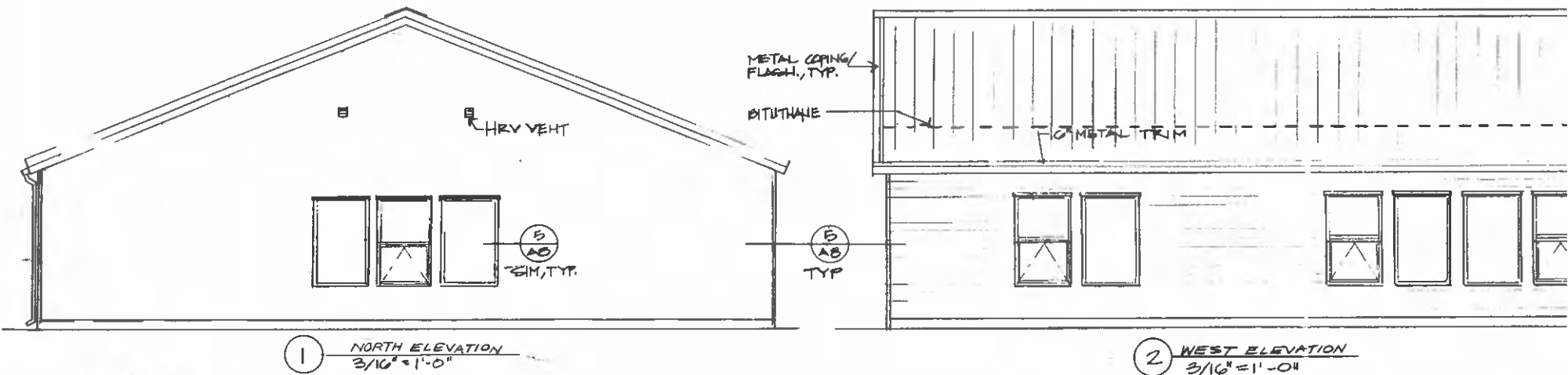
INTERIOR SLABS FINISHED W/ STEEL TROWEL OR POWER TROWEL, MAX ELEV. CHANGE 1/8" IN 10'-0"

(AD ALT NO1)

CONCRETE COLOR AT SOLAR ENTRY SLAB - ADD LAMP BLACK OXIDE 4LB. PER SACK OF CEMENT



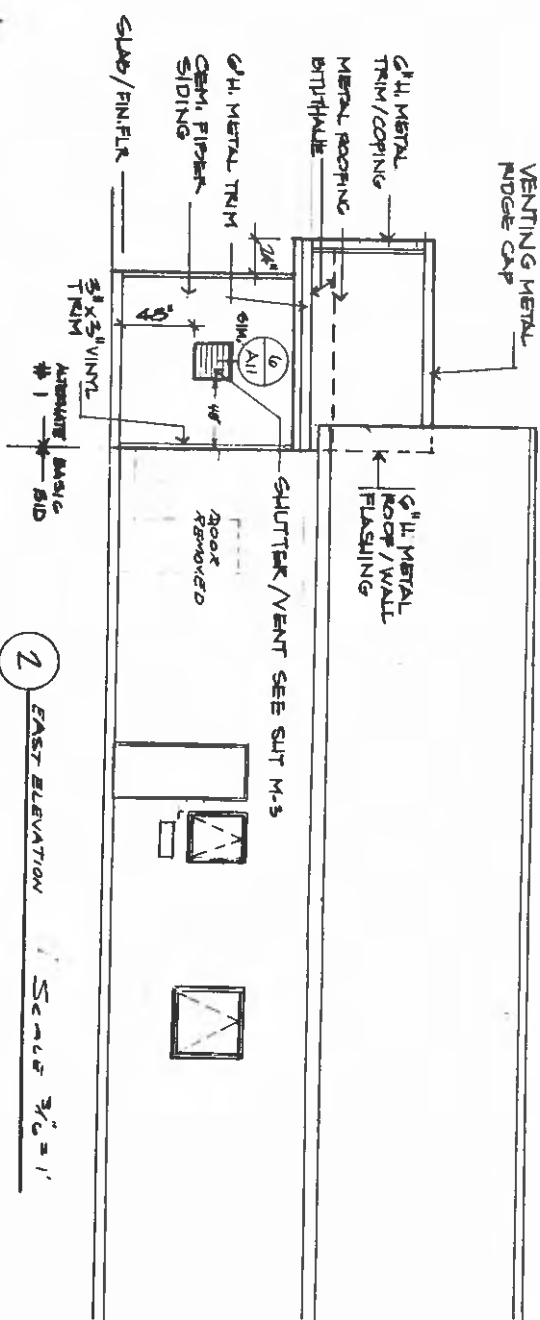




GUSTAVUS LIBRARY	
ELEVATION 3 / SIDING DETAIL	SHEET
	DATE

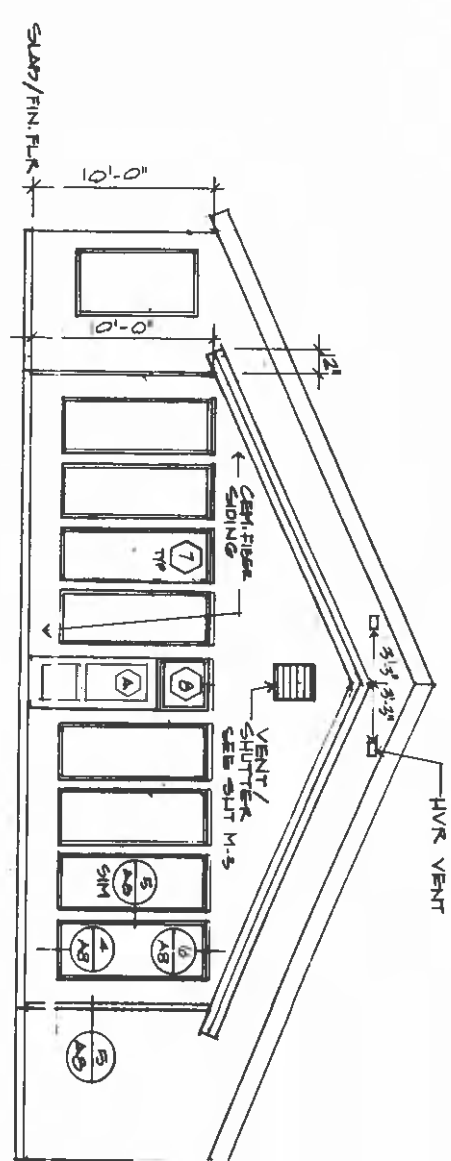


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A8

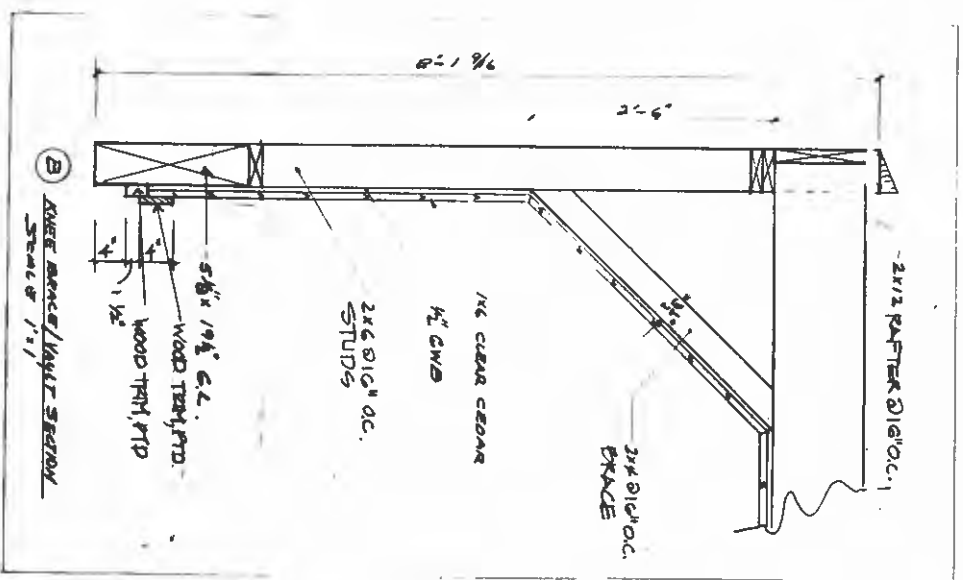
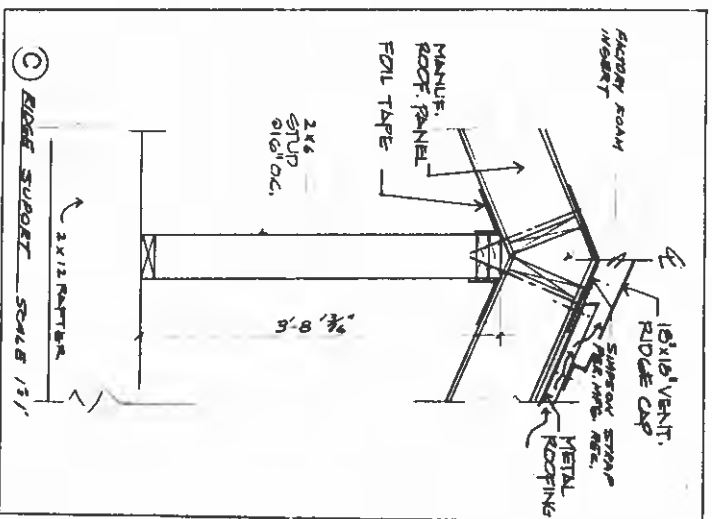


ALTERNATE NO. 1 SOUTH ENTRY

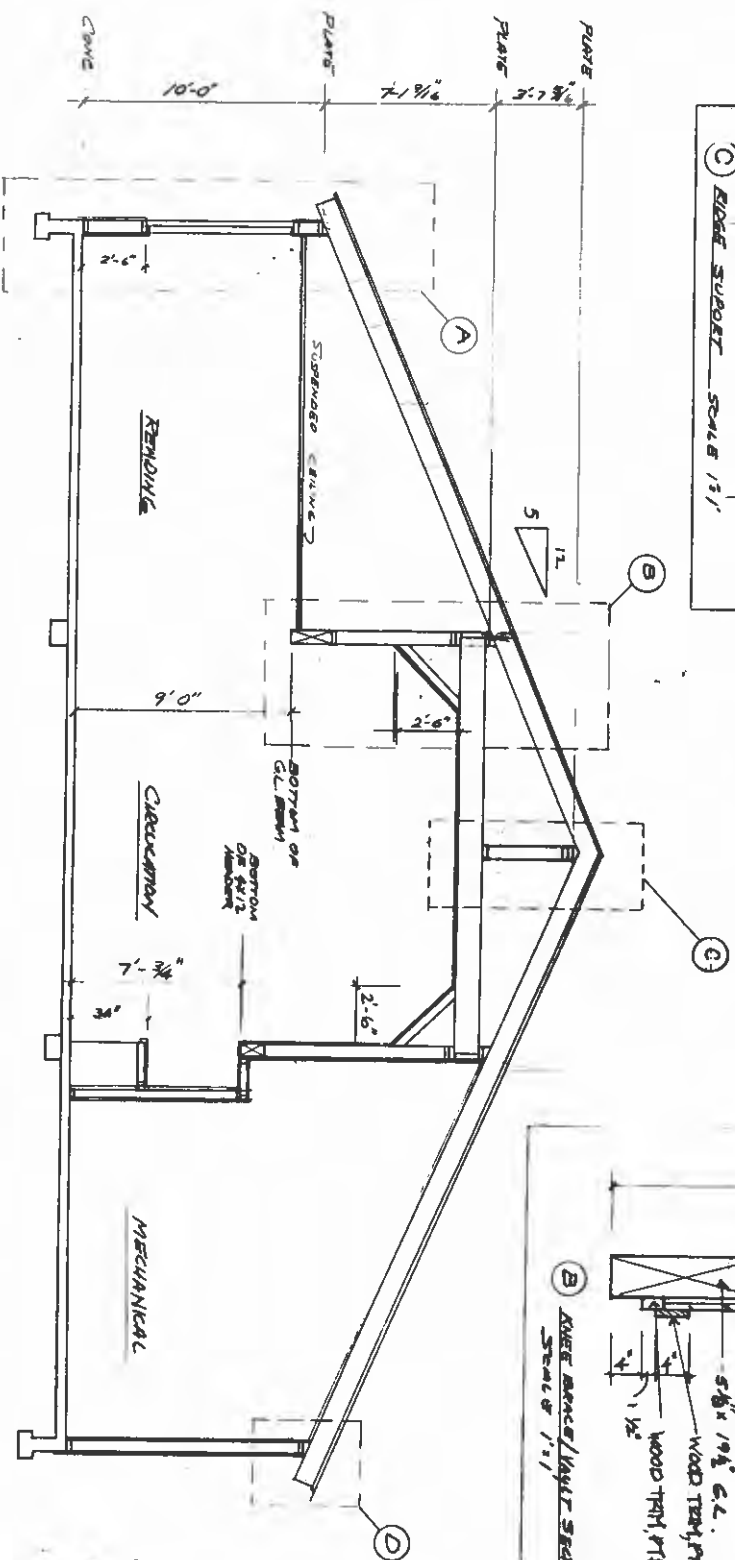
1 SOUTH ELEVATION
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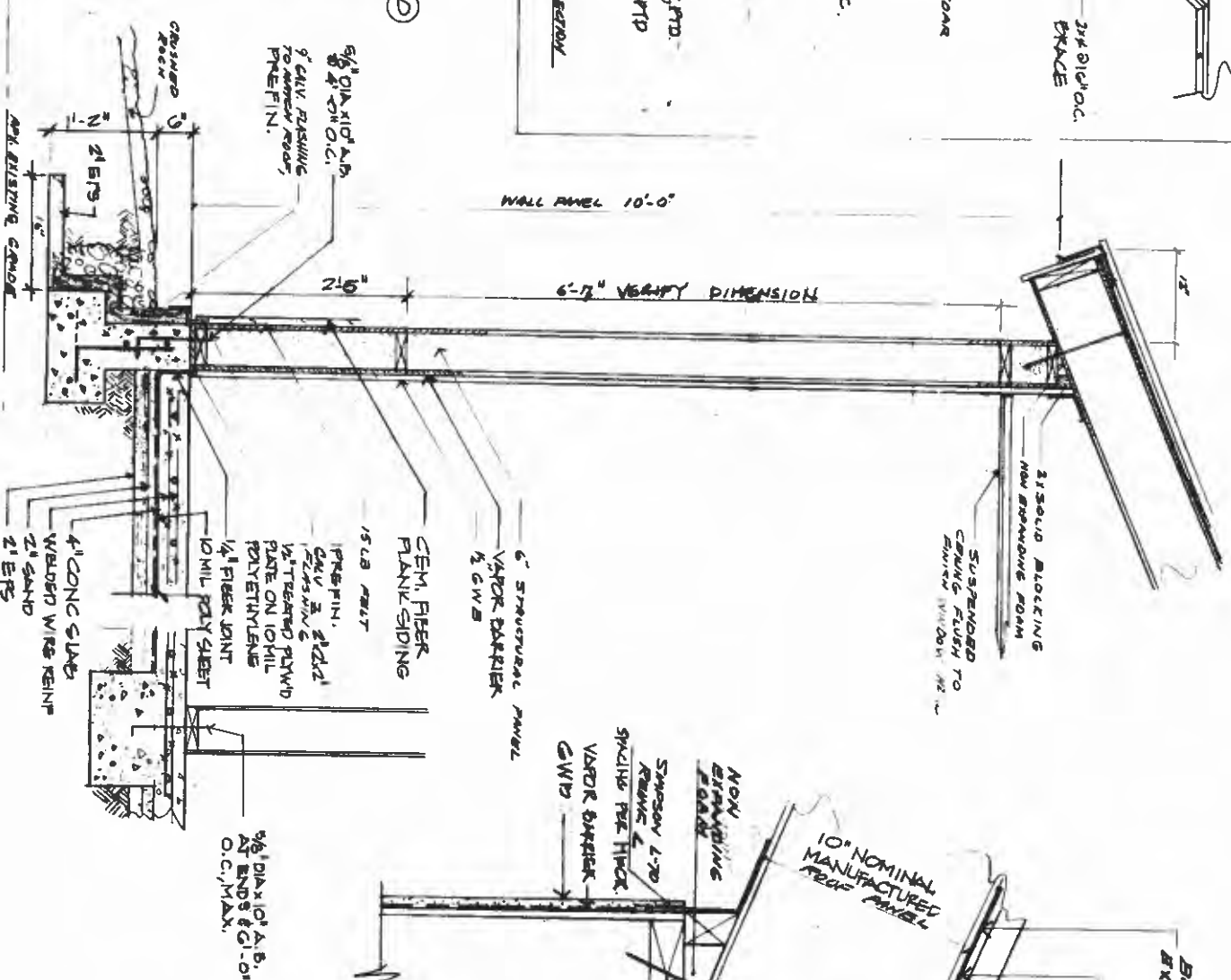
GUSTAVUS LIB
JANUARY



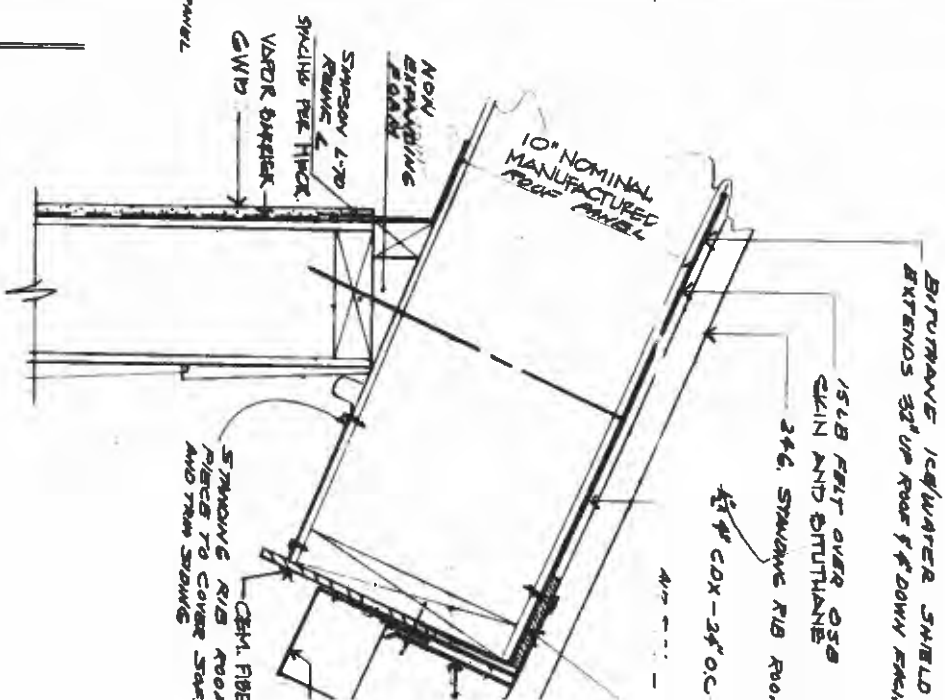
5 BUILDING SECTION
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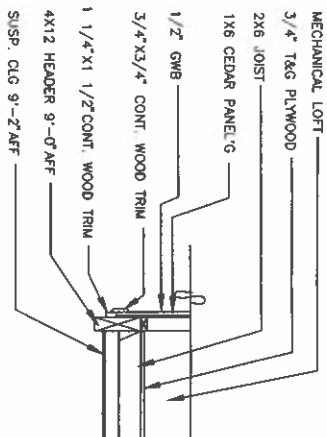
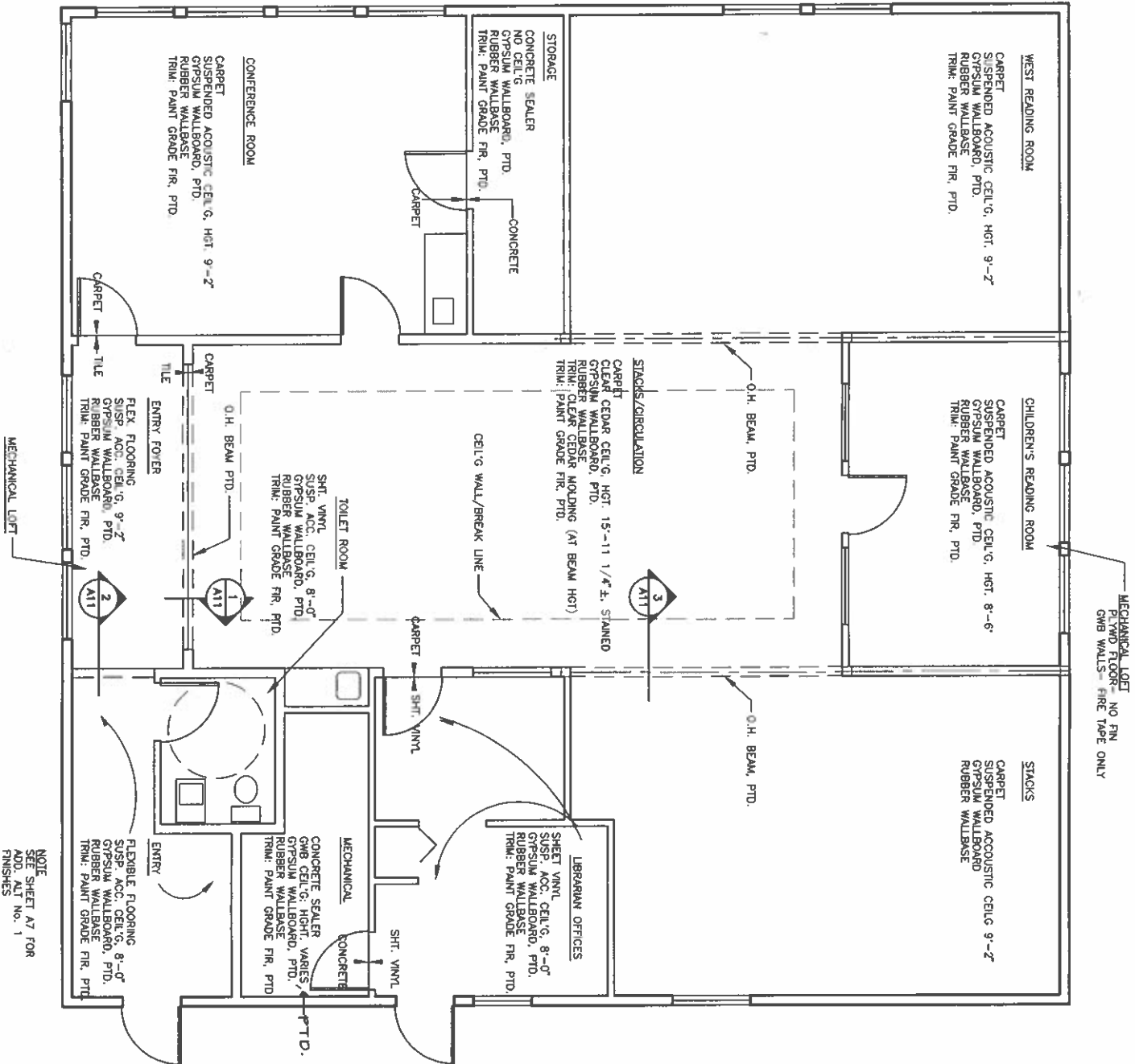


A SCALE 1/31 WALL SECTION

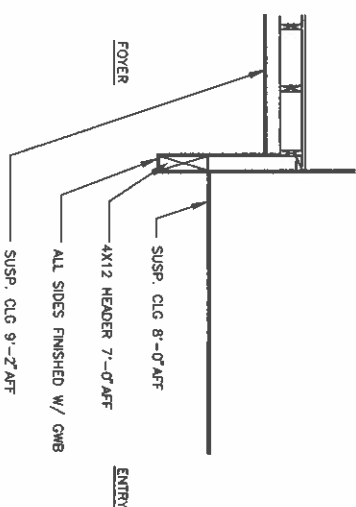


D ROOF SHEET
SCALE 3/16"

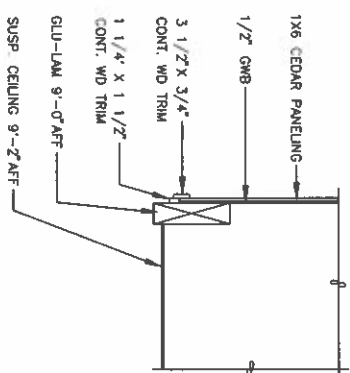




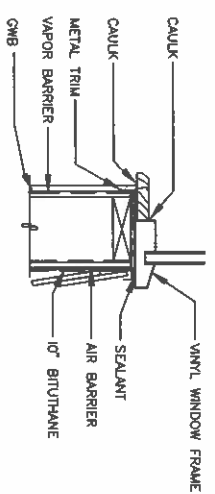
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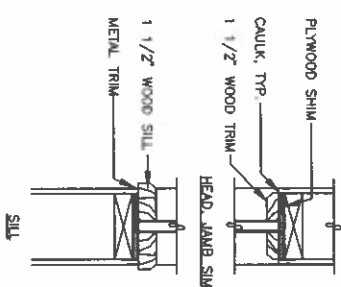
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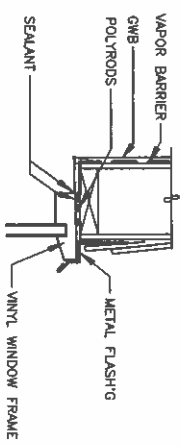
3 SECTION
Scale: 1/2"=1'-0"



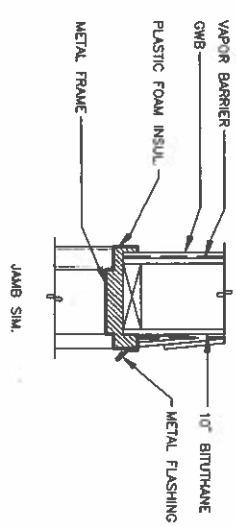
4 WINDOW DETAIL
Scale: 1 1/2"=1'-0"



5 INT. WINDOW DETAIL
Scale: 1 1/2"=1'-0"



6 WINDOW HEAD DETAIL
Scale: 1 1/2"=1'-0"



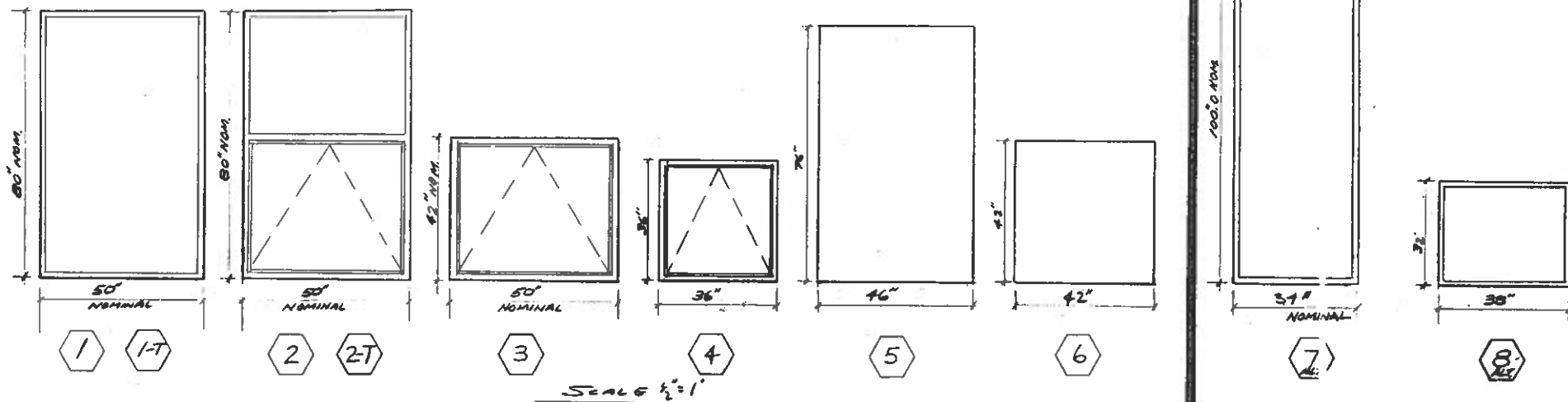
7 METAL DOOR DETAIL
Scale: 1 1/2"=1'-0"



GUSTAVUS LIBRARY
MAIN ROAD
GUSTAVUS, ALASKA
FOR THE
GUSTAVUS LIBRARY COMMITTEE



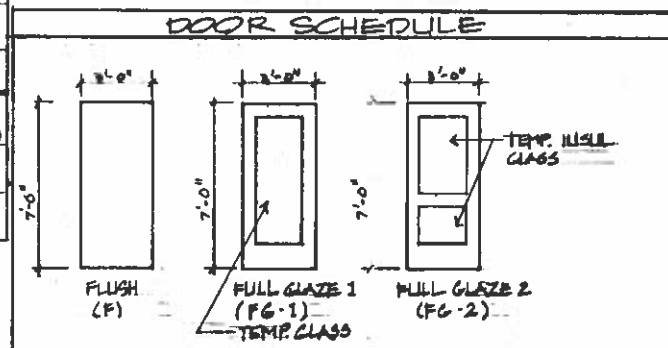
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A12



WINDOW SCHEDULE

WINDOW SCHEDULE									
WINDOW #	QTY	STYLE	FRAME	TYPE	SCREEN	SPACER	GLAZE	SOURCE	
1	7	FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	-	1/2" MIN. NON- CONDUCTING	3 1/4" DBL. TEMPERED	FROM DOOR BLANKS (46x76)	
1-T	2	FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	-	1/2" MIN. NON- CONDUCTING	3 1/4" TRIPLE TEMPERED	FROM DOOR BLANKS (46x76)	
2	3	AWNING/ FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	YES	NON- CONDUCTING	DBL., 1/4"	—	
2-T	1	AWNING/ FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	YES	NON- CONDUCTING	5/16" TRIPLE TEMPERED	—	
3	1	AWNING	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	YES	NON- CONDUCTING	DBL.	—	
4	1	AWNING	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	YES	NON- CONDUCTING	DBL.	—	
5	2 (2 ALT)	FIXED	NONE	CLEAR	-	-	3/16" SINGLE TEMPERED	—	
6	1	FIXED	NONE	CLEAR	-	-	3/16" SINGLE	—	
SOLAR ALT.	7	8	FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	-	1/2" MIN. NON- CONDUCTING	5/16" DBL. TEMPERED	FROM DOOR BLANK (34x96)
SOLAR ALT.	8	1	FIXED	FLANGED VINYL	HARD COAT LOW-E ARGON/GAS	-	1/2" MIN. NON- CONDUCTING	DBL.	—
SOLAR ALT.	—	3	—	—	LOCK SPRINGS AT ALL LOCATIONS	YES	1- 19 1/2" x 19 1/2" 2- 23 1/2" x 23 1/2"	PROVIDE SCREENS AT VENT/SHUTTERS	

DOOR SCHEDULE





NOTE: FILL BOILER, MANIFOLD & ALL HEAT DISTRIBUTION TUBING W/ DISTILLED WATER PRIOR TO CONNECTING TO DOMESTIC WATER



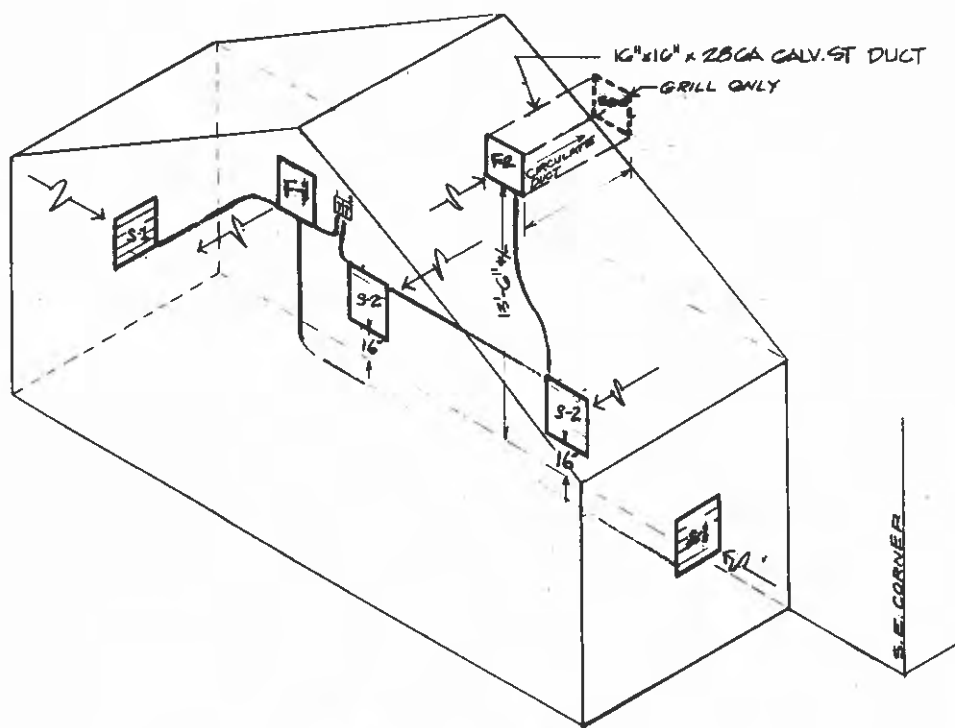
PREV. WIND

STEFAN - ANDREAS

C701-5C0 / 00F \ YWJ C027-5C0 / 00E \

[illegible]

GUSTAVUS LIBRARY
GUSTAVUS ALASKA



SOLAR VENTILATION & ELECTRICAL COMPONENTS

- (A) ~~REINFORCEMENT HUB~~ LITHONIA
ONE - 2PM3 G-B 932 18LD 180
250 PWS 1936 400W
- (B) ~~EXTERIOR WALLPACK GUDDIE (SUNSHOWER)~~
GUTH
ONE - 5N312-70 HP 1-REC
70W HPS

VENT SYSTEM

- F-1 FAN-EXHAUST-1250 CFM 16", FROM SCHAEFER
F-2 FAN-CIRCULATE " -SAME " "
S-1 SHUTTERS (TWO) 20 MOTOR OPEN SCHAEFER
S-2 SHUTTERS (TWO) SAME " "
S-2-W SHUTTER (ONE) WITHOUT AUTO OPENER
T-1 & T-2 THERMOSTATS & VARIABLE SPEED FAN CONTROL
ALL COMPONENTS 110V

F-1, F-2, S-1, S-2, S-2-W, T-1 & T-2 ARE TWO GREEN HOUSE VENTILATION KIT 5 (#3462) FROM SCHAEFER. EACH KIT CONTAINS ONE SHUTTERED FAN, TWO AUTO SHUTTERS, ONE THERMOSTAT AND ONE VARIABLE SPEED FAN CONTROL. ONE EXTRA SHUTTER (NO MOTOR OPENER) MUST BE ORDERED FOR S-2-W GRILL.

OPERATION

VARIABLE SPEED FANS OPERATE INDEPENDENTLY TO CIRCULATE HEATED AIR OR TO EXHAUST WARM AIR IN SUMMER. PRESSURES ARE BALANCED BY OVERSIZED MOTOR OPERATED SHUTTERS (NO IMPACT ON HRV)

SOLARIUM VENTILATORS CAN ALSO BE USED TO PROVIDE EXTRA VENTILATION TO MEETING ROOM

ALL INTERIOR DOORS ARE UNDER CUT 1 1/2" AND A RELIEF DUCT IS PROVIDED IN MEETING ROOM.

PERFORMANCE

TWO HRV'S (SEE MECHANICAL) PROVIDE 310 CFM - 12 CFM PER PERSON AT RATED OCCUPANCY. AN ADDITIONAL 1250 CFM OF CONDITIONED AIR IS AVAILABLE VIA SOLARIUM FOR A TOTAL OF 1560 CFM AT .0 STATIC PRESSURE. MINIMAL DUCTING ON HRV COMBINED WITH NATURAL INFILTRATION SHOULD OFFSET STATIC PRESSURE.

$$HRV = .74 \text{ ACH}$$

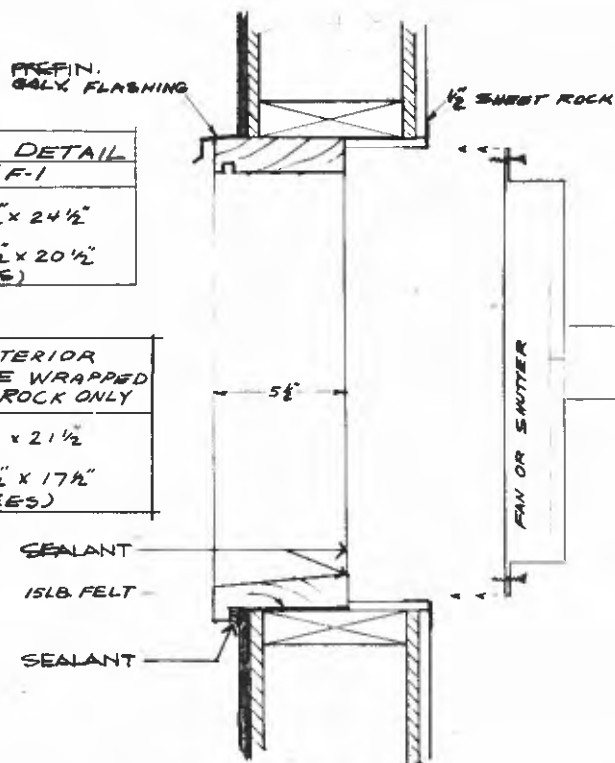
$$HRV \& \text{ SOLARIUM} = 5.0 \text{ ACH}$$

FAN/SHUTTER DETAIL FOR S-1 & F-1

S-1 R.O. 24 1/2" x 24 1/2"
F-1 R.O. 20 1/2" x 20 1/2"
(VERIFY SIZES)

F-2 & S-2 - INTERIOR OPENINGS ARE WRAPPED WITH SHEET ROCK ONLY

S-2 R.O. 21 1/2" x 21 1/2"
F-2 R.O. 17 1/2" x 17 1/2"
(VERIFY SIZES)



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SOLAR ENTRY ADD'N - MECH/ELECT/
WINDOW SECTION

CHECK RISE

PLUMBING MATERIALS

Domestic Water Piping: Type L hard drawn copper, sweat fittings with 95-5 solder above grade and silver solder or brazed below grade.

Fuel Oil Piping: Type K soft tempered copper with flare fittings.

Waste Water Piping: In and below the slab to 5'-0" beyond the building line - Service weight no-hub cast iron. Above the slab - Schedule 40 PVC.

Fittings: As required, all by Zurn, J R Smith or approved equal.

Heating Supply and Return: See Sheet M-1 and M-2.

Valves: For 125 PSI working pressure. Provide bronze gate valves unless otherwise required. Provide chrome finished brass ball angle stops at all domestic water connections to plumbing fixtures.

MECHANICAL EQUIPMENT

Boiler: Viessmann Model BEA 22 with Riello Burner and all required controls.

Chimney: Metalbestos or equal, 6" double wall with barometric damper, insulating thimble at roof penetration, rain cap, and cleanout at bottom.

Fuel Filter: General 2A-700, install with 165 degree fusible oil safety valve and isolation valves on fuel oil supply.

Automatic Controls: See Sheets M-1 and M-2. Low voltage type.

Heat Recovery and Ventilation Units and Air Distribution Equipment: See Sheet M-1 and M-2.

Hot Water Heater: Ariston No. 4E060, 4 gallon, 1350 Watt.

Water Filter: Provide one each Omni-R-13 (sediment), Omni-R-14, (5 micron, activated carbon), and Mighty Pure MP-22 (110 Volt, 24 watt ultraviolet bacterial, 6.6 GPM).

Well Pump and Pressure Tank Package: Teel No. 3P715

Water Softener: Water Boss 9000

WATER FILTER & HOUSING - OMNI CARTRIDGE TYPE - 1 & 5 MICRON BY WATER TECHNOLOGY DIV., CHS GROUP INC., TELE: 1-800-935-0100

PLUMBING FIXTURES

Water Closets: American Standard 2216.143 16-1/8" Height El. 1.6 with open front solid plastic seat. Color: white.

Lavatory, L-1: American Standard 9140.013, vitreous china wheelchair accessible with American Standard 7830.002-372H chrome faucet with wrist blades, American Standard 7723.018 offset grid drain and J. R. Smith 0700-27-M31 floor mounted carrier. Color: white.

Sink, S-1: Just KE-2217-A-CR, 18 stainless steel, 22" x 17" x 4", with chrome plated brass grid drain and American Standard 7830.002-372H chrome faucet with wrist blades.

Sink, S-2: Fiberglass laundry tray, 22" x 22" +/- with steel legs, chrome plated brass grid drain, and Elkay LK-401 or equal wall mounted mixing faucet with vacuum breaker, spout with pail hook, wall brace, and 3/4" threaded hose outlet.

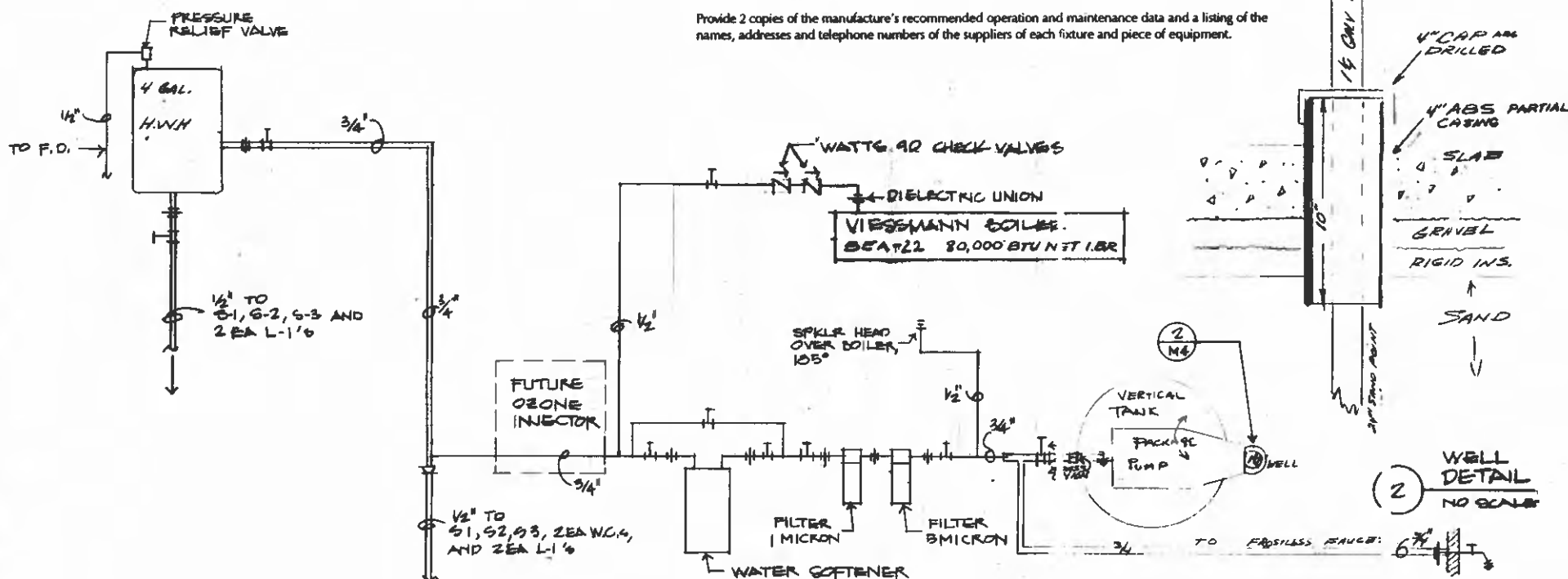
SINK, S-3: SEE S-1

SUBMITTALS

Provide for approval 4 copies of a mechanical construction material list, itemizing all materials to be incorporated into the project.

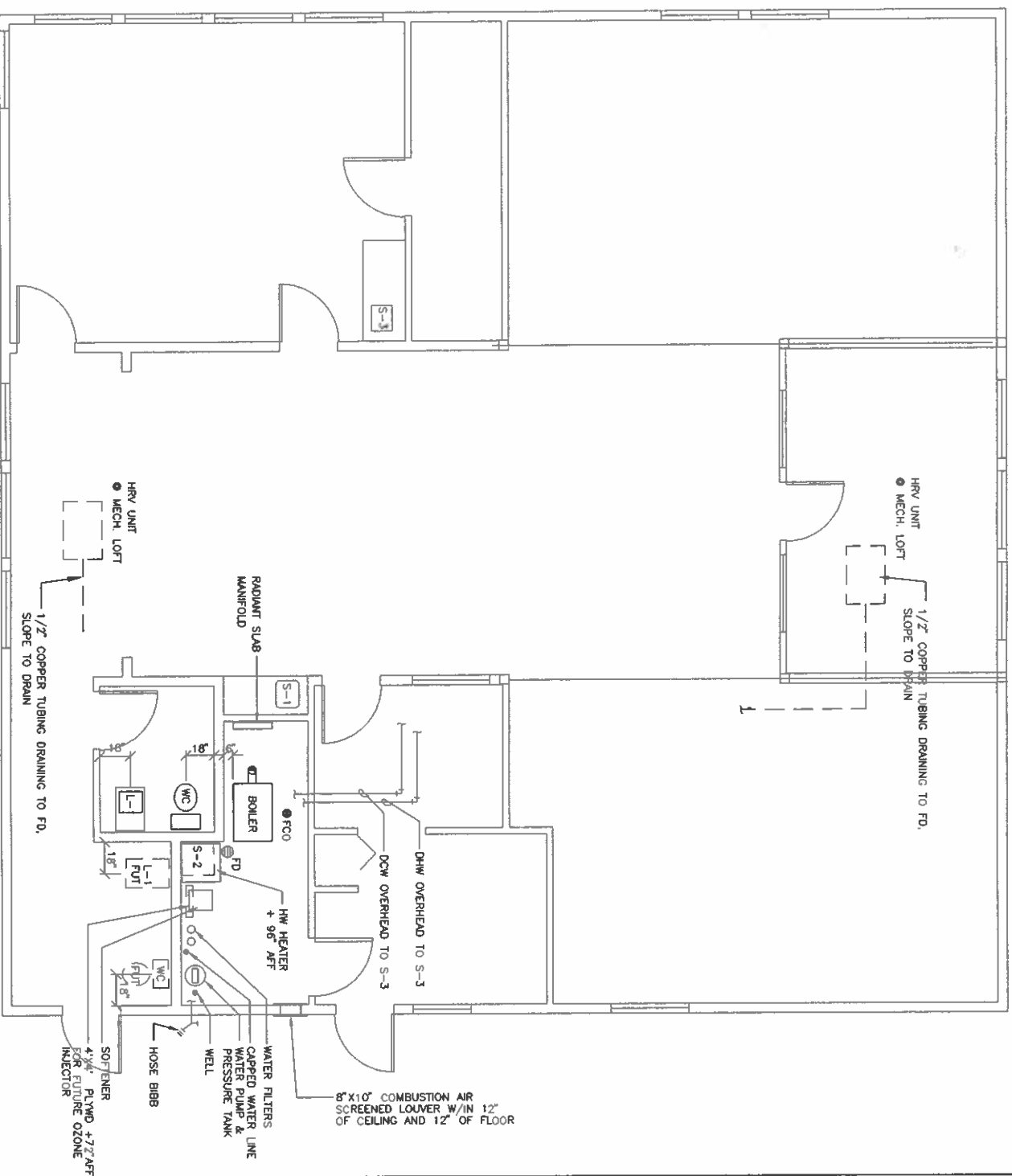
Provide for approval 4 copies of manufacturer's data for each item of mechanical equipment to be incorporated into the project.

Provide 2 copies of the manufacturer's recommended operation and maintenance data and a listing of the names, addresses and telephone numbers of the suppliers of each fixture and piece of equipment.



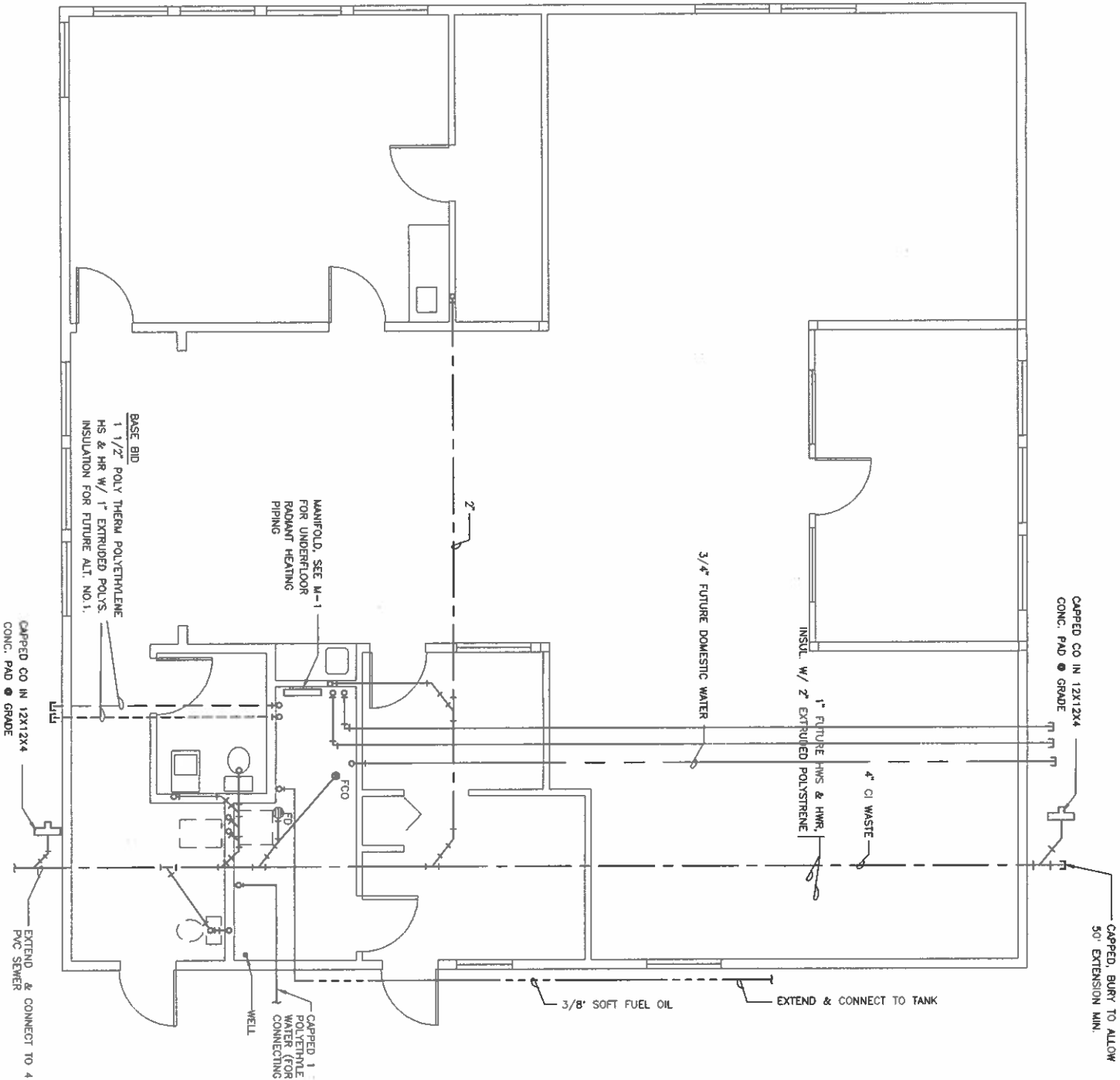
REVISIONS

Date
Scale



MECHANICAL PLAN
Scale: 1/4"=1'-0"

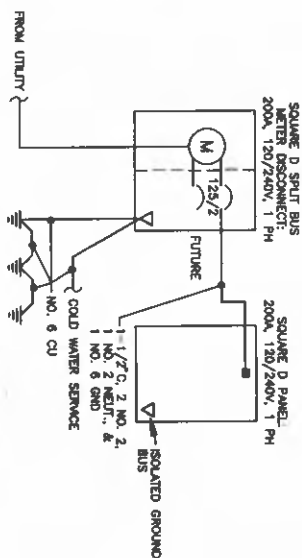
- NOTES:
1. RUN DOMESTIC HOT & COLD WATER W/HEAT EXCHANGER CONCEALED IN ATTIC AND W/INSULATION.
 2. EXTEND DOMESTIC HOT & COLD WATER TO L-1 (FUTURE) AND DOMESTIC COLD WATER TO WC (FUTURE). CAP IN WALL AT 12" AFF.
 3. PROVIDE UNISURF & PLYWOOD BRACKET FOR ELEVATED HOT WATER HEATER.



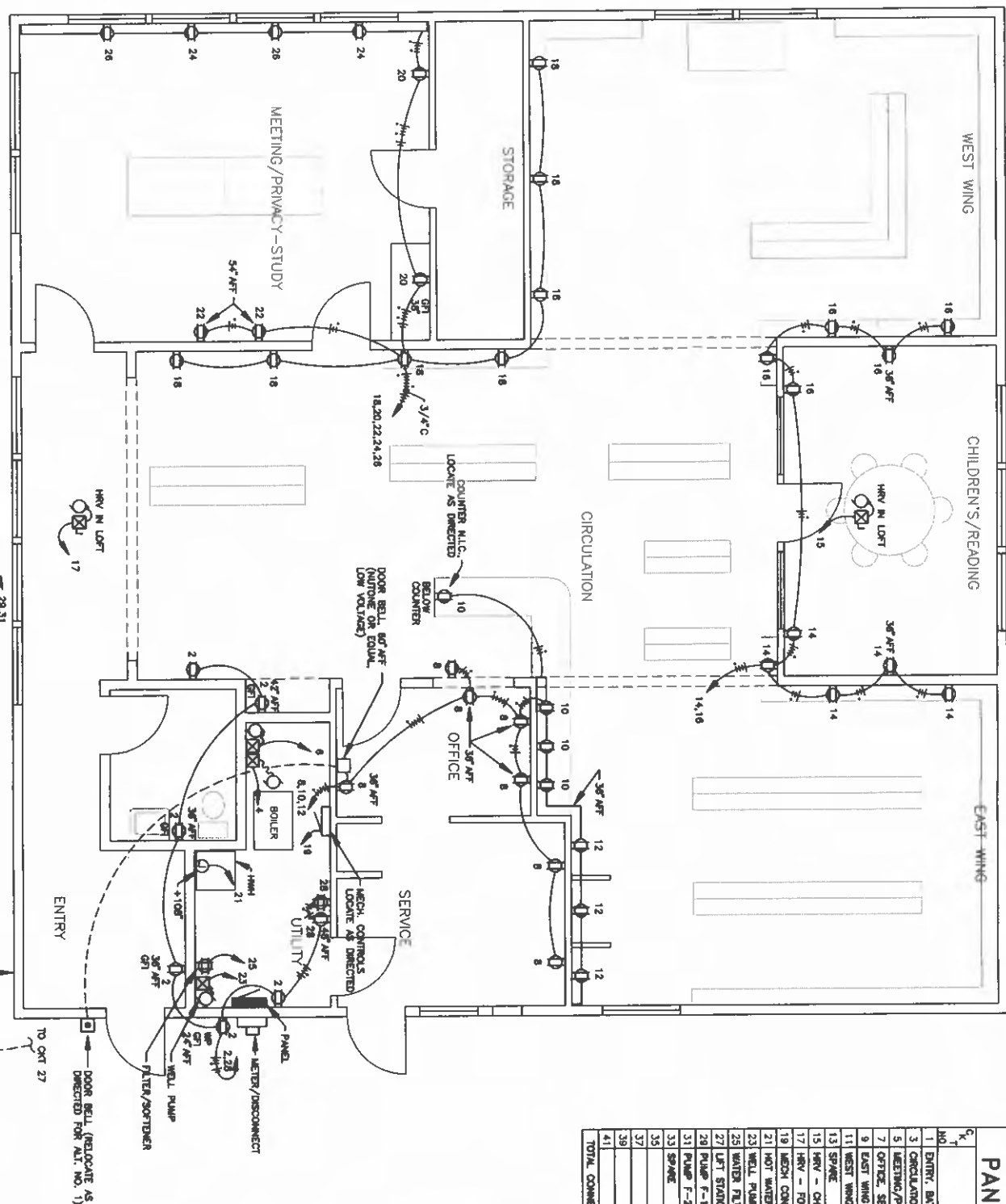
BELOW SLAB PIPING PLAN
Scale: 1/4"=1'-0"

- NOTES:
1. EXTEND 2" WASTE TO L-1 (CAP IN WALL 12" AFF.
 2. EXTEND 4" WASTE TO WC (FUTURE) INSTALL TOILET FLANGE FLUS CAP W/MECH. SEALING PLUG METAL COVER.
 3. FUTURE AND HOUSE VENTS CONCEAL FUTURE VENT PIP COMBINE FUTURE VENTS, EX S-3 INTO ONE HOUSE VENT IN MECH. ROOM. AT S-3 PE VENT ACCESSIBLE FROM STO

SINGLE LINE DIAGRAM
NO SCALE



FLOOR PLAN
SCALE: 1/4"=1'-0"



PANEL										SIZE	VOLTS/PHASE			MAIN		LOCATION		MOUNT	
										200 AMPS	120/240V, 1 PH			LUGS ONLY		UTILITY ROOM		SURFACE	
K ₁ NO	K ₂ NO	DESCRIPTION	BREAKER AMP/ POLE	KVA				BREAKER AMP/ POLE	DESCRIPTION	K ₁ NO	K ₂ NO								
				CKT	A ₀	B ₀	CKT												
1		ENTRY, BATH, UTILITY, ATTC	20/1	1,2	2,5	2,1	1,3	20/1	EXTENSION, ENTRY, BATH, UTILITY	1	2								
3		CIRCULATION		1,2					BOILER	4	6								
5		MEETING/PRIVATE-STUDY		1,6	2,2		0,8		OFFICE, SERVICE, DOOR BELL	7	8								
7		OFFICE, SERVICE, CHILDREN'S/READING		1,1		2,4	1,3		CIRCULATION, EAST WING	10	10								
9		EAST WING		1,2	1,9		0,7		EAST WING	12	12								
11		WEST WING		1,2		1,7	0,5		CHILDREN'S/READING, EAST WING	14	14								
13		SERVICE			0,9		0,8		CHILDREN'S/READING, WEST WING	16	16								
15		HEAVY - CHILDREN'S READING		0,2		1,1	0,8			18	18								
17		HEAVY - POWER		0,2	1,5		1,3		WEST WING, CIRCULATION	20	20								
19		MISC. CONTROLS		0,2	0,2		0,8	0,4	MEETING/PRIVATE COUNCIL, MISC.	22	22								
21		HOT WATER HEATER (HWH)		1,4	1,8		0,6		MEETING/PRIVATE COMPUTER	24	24								
23		WELL PUMP			0,9		1,3	0,4	MEETING/PRIVATE COMPUTER	26	26								
25		WATER FILTER/SEPARATOR			0,4	0,8	0,4		TELEPHONE/COMMUNICATION PANEL	28	28								
27		LIFT STATION PUMP (1/3 HP)			0,9		1,3	0,4		30	30								
28		PUMP F-1 (1/4 HP) ADD. ALT. NO.1			0,7					32	32								
30		PUMP F-2 (1/4 HP) ADD. ALT. NO.1			0,7					34	34								
33		SERVICE					0,7			36	36								
35										38	38								
37										40	40								
39					0,2					42	42								
41																			
TOTAL CONNECTED LOAD = 23.7 KW / 104 AMPS					12,5		11,2		20/1	FIRE ALARM CONTROL PANEL									

ELECTRICAL SPECIFICATION

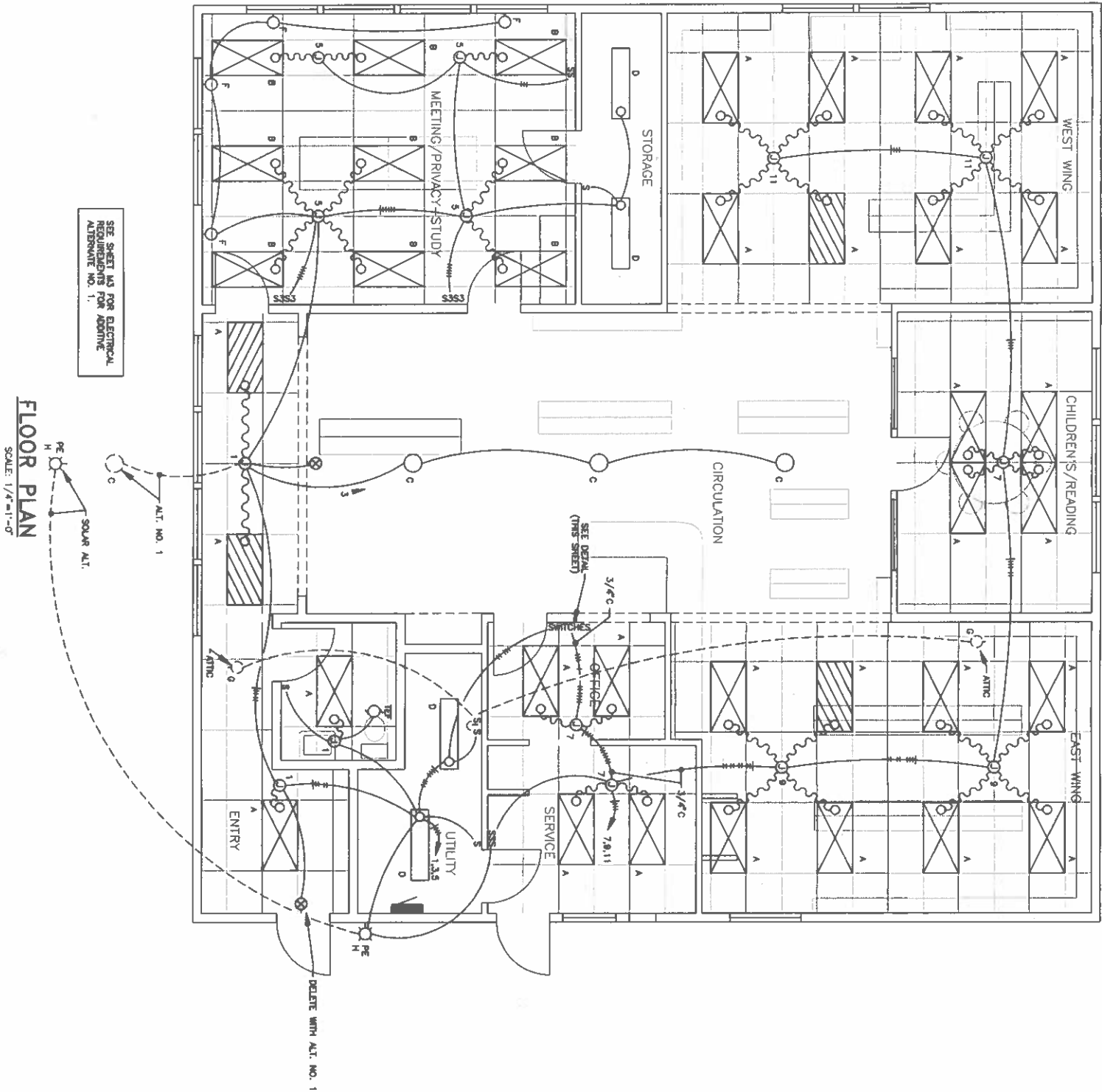
1. NO ELECTRICAL CORDS OR DEVICES IN OUTSIDE WALLS. NO CONDUIT IN SLAB. ALL CONDUIT SHALL BE ROUTED IN TRUSS AREA AND THROUGH TOP INSIDE WALL PLATES.
2. SEE ITEM PLAN A2 FOR VARD LIFT STATION & REQUIREMENTS.
3. SEE WHITE WATER SYSTEM A3 FOR LIFT STATION LOCATION.
4. SEE A3 FOR SOLAR ENTRY REQUIREMENTS (ADJOINT ALTERNATE 1)
5. SURFACE MOUNT CONDUIT AND BOXES ARE ALLOWED IN UTILITY ROOM ONLY.

10010 GENERAL

- A. The electrical drawings are design documents in nature. The purpose of these drawings is to provide information regarding the location and installation of electrical devices, unless dimensioned otherwise. It is the responsibility of the contractor to verify the accuracy of the drawings or to seek clarification from the architect, manufacturer, or mechanical engineer.
- B. Comply with the latest editions of the NEC, NFPA, and NFPA codes and standards, as well as the applicable Federal, State, and local codes.
- C. Mount electrical devices at heights above the finished floor as follows:
- | Device | Height |
|---------------------------|-----------|
| Switches | 48 inches |
| Receptacles | 18 inches |
| Indicator lights | 18 inches |
| F.A. Manual Pull Stations | 48 inches |
| Fire Alarm Control Panels | 60 inches |
| Alarm and Signal Devices | 80 inches |
- D. Unless otherwise noted, provide new, high-quality equipment and materials which are standard set current with the industry, and approved by Underwriters' Laboratory.
- E. All products shall be delivered and stored in original containers. Protect all items from dirt, water, damage, and/or mechanical damage.
- 16110 RACKMOUNTS
- A. All rigid steel conduit, electrical metallic tubing, and fittings shall meet ANSI requirements.
- B. Install conduit mechanically and electrically continuous from termination to termination. Connect securely to cabinets, junction boxes, and device buses.
- 16120 WIRE AND CABLE
- A. Utilize 600 volt rated wire insulation.
- B. Unless otherwise note as follows, unless otherwise noted:
1. No. 12 AWG for branch circuit wiring.
 2. No. 18 AWG for control circuit wiring.
 3. No. 18 AWG for lighting fixture wiring.
- C. Size all conductors according to American Wire Gauge (AWG).
- D. Provide conductors with TWN, THWN, THHN, or XHHW insulation, unless otherwise noted.
- E. Provide suitable type connectors for conductors. Utilize preinsulated cable end caps for conductors No. 10 AWG or less in size, except for Type III or Type IV with a preformed cover, heat shrink tubing, or tape for insulation.
- F. Provide all premium rated cables. Computer cable shall be Cat. 5 UTP shielded twisted pair cable shall be 8 pin; 24 gauge. Provide 19x16 2480 computer ports.
- 16130 OUTLET AND JUNCTION BOXES
- A. Provide zinc coated, painted steel outlet and junction boxes as required. Provide plaster wings as required.
- B. Install junction boxes in permanently accessible locations only.
- 16140 SWITCHES AND RECEPTACLES
- A. Provide specification grade, enclosed, weather type switches, approved by UL, rated 20 amperes at 277 volts.
- B. Provide specification grade, NEMA 5-20R, plastic receptacles, approved by UL. Provide receptacles with an insulating ground fault interrupter (GFI) for outdoor use. Receptacles shall be ivory with a green dot or triangle for identification.
- C. Devices shall be ivory colored with stainless steel plates.
- A. Provide heavy duty type disconnects, rated for 600 volt service. Disconnects shall be weather resistant and have a lock-out/tag-out capability. Each shall be horsepower rated with quick-make, quick-break switching.
- 16180 CIRCUIT BREAKERS
- A. Provide 10,000 ampere symmetrical interrupting capacity minimum unless otherwise noted. All circuit breakers shall be a built-in type.
- B. The schedule in the drawings indicates the number of poles and rating ratings for panel circuits to electrical devices. Provide the ratings as required with changes in equipment or circuit requirements.
- C. Circuit air feeder and branch circuits as shown in the drawings.
- 16190 SUPPORTING DEVICES
- A. Conduit. Utilize galvanized conduit drops where surfaces mounted and support clips or hangers where suspended.
- B. Buses. Utilize purpose made hangers as required where flush mounted.
- C. Allow for a minimum safety factor of five to one to support equipment loads. Hangers tapes and wires are not approved.
- 16400 GROUNDING
- A. Connect all non-current carrying electrical equipment, raceways, and enclosures to the service entrance ground bar.
- 16470 PANELBOARDS
- A. Panelboards shall be sized and rated in accordance to the panelboard load. They shall be installed in a dry location, protected from dust, moisture, vibration, and other physical damage. Provide a metal terminal bar. Provide a ground terminal bar if ground conductors are terminated in the panelboard. Space for 10,000 symmetrical RMS ampere, unless otherwise noted.
- B. Size the enclosure to allow for adequate wire gutter space. The front shall be a single element with a lockable door. The front shall be provided only with the door open. Provide a lock and key for access to the interior. The door shall be provided with a locking mechanism. The interior assembly shall be delectric with the front cover removed.
- C. Mount with the top of the enclosure at 72 inches above finished floor level. The enclosure shall be secured to the panelboard frame after the enclosure has been installed.
- D. Install circuit breakers in the order specified in the drawing legend. The circuit breaker shall be labeled with its type and rating. Label the circuit directory with circuit descriptions as they are shown in the drawing panelboard schedules. The directory shall be configured identically with the circuit breaker configuration.

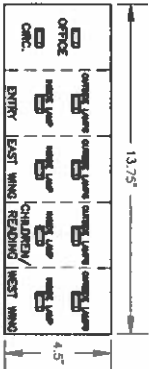
LEGEND

- | | |
|-----|--|
| AF | ABOVE FINISHED FLOOR |
| ACP | PIRE ALARM CONTROL PANEL |
| GR | GROUND FAULT INTERRUPTER |
| S | SMALL POLE SWITCH |
| S | SMALL POLE ILLUMINATED SWITCH |
| S3 | THREE-WAY SWITCH |
| PE | PHOTOELECTRIC CELL |
| | FLUORESCENT LUMINAIRE WITH EMERGENCY BALLAST |
| | FLUORESCENT LUMINAIRE |
| | SURFACE OR RECESSED LUMINAIRE |
| | WALL MOUNTED LUMINAIRE |
| | EXTERIOR WALL MOUNTED LUMINAIRE |
| | EMERGENCY EXIT SIGN |
| | ISOLATED GROUND RECEPTACLE |
| | DUPLEX RECEPTACLE |
| | DOUBLE DUPLEX RECEPTACLE |
| | TWIN DUCT RACEWAY |
| | JUNCTION BOX |
| | PANELBOARD |
| | MOTOR CONNECTION |
| | STARTER |
| | PURIFICATION |
| | TELEPHONE RECEPTACLE |
| | COMPUTER RECEPTACLE |
| | SMOKE DETECTOR |
| | HORN/STROKE |
| | GROUNDING |
| | CONDUIT 1/2" UN |
| | UNGROUNDING CONDUCTIONS |
| | NEUTRAL #10 WITH DOT |
| | NEUTRAL #12 OTHERWISE |
| | GROUND CONDUCTOR |
- CONDUCTIONS NOT SHOWN WHERE ONLY #12 NEUTRAL AND UNGROUNDING CONDUCTOR ARE REQUIRED

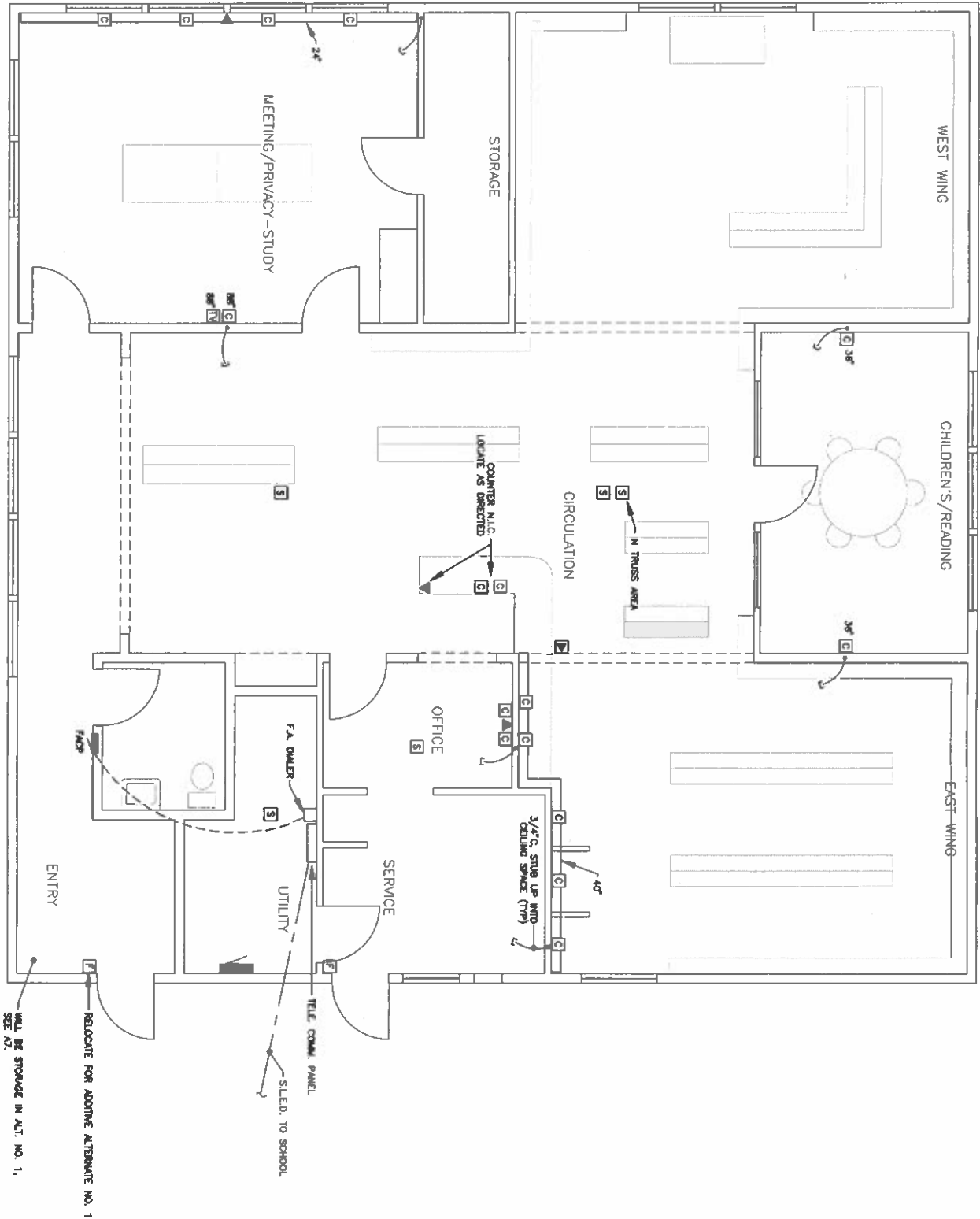


FLOOR PLAN
SCALE: 1/4"=1'-0"

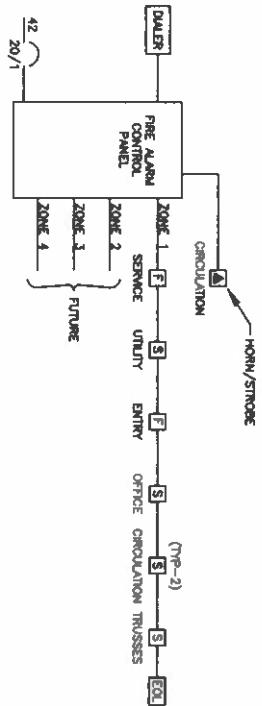
LUMINAIRE SCHEDULE			
TYPE	DESCRIPTION	MANUFACTURER	REMARKS
A	2'x4' FLUORESCENT TROFFER WITH ACRYLIC LENS	UTIMAX 20T 332 A18 120 GEB PMS1856 LPS-SP25	(1) 32W T8 3500K, CRI 85 PROMOTE ENERGY BALUST FOR (3)
B	2'x4' FLUORESCENT PARABOLIC TROFFER	UTIMAX 2PM3 G B 332 T8LD 120 GEB PMS1856	(2) 32W T8 3500K, CRI 85
C	PENDANT MOUNT HMO (PMSHMO)	HOLOPHANE BL24-40LMH-12-E-29	(1) 400W MH MOUNT AT 14' AFF TO BOTTOM OF LUMINAIRE.
D	4' SURFACE MOUNT FLUORESCENT INDUSTRIAL	UTIMAX PV 232 120	(2) 32W T8 3500K, CRI 85
F	WALL SCONCE		
G	WALL MOUNT FLUORESCENT WITH TRANSLUCENT LENS	RUUD LIGHTING E1228-1	(2) 13W T1
H	EXTERIOR WALLPACK - CUTOFF (SHOOWMEN)	SUNY SMO12-70W-1-PEC	(1) 70W HPS MOUNT AT 12' AFF.
X	EMERGENCY EXIT LIGHT	UTIMAX LES 1 G 120/277 ELM	LBD



DETAIL - LIGHTING CONTROLS
NO SCALE



FLOOR PLAN
SCALE: 1/4"=1'-0"



- NOTES:
1. PROVIDE A 4 ZONE MICROPROCESSOR BASED, SUPPRESSED, TWO WIRE, MODULAR DESIGN, CLASS B FIRE ALARM SYSTEM. THE SYSTEM SHALL BE IN ACCORDANCE WITH NFPA 72 OR APPROVED EQUIV.
 2. ALL CABLES SHALL MEET REQUIREMENTS OF ARTICLE 760 OF THE NEC.
 3. THE SYSTEM SHALL BE CERTIFIED BY A NICET CERTIFIED FIRE ALARM TECHNICIAN.

RISER DIAGRAM - FIRE ALARM SYSTEM
NO SCALE